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THE FIRE IN the Beaumont oil district, which was reported in our news columns recently, seems likely to have disastrous effects on that region. Apart from the actual money loss, which was serious, the result may be the closing down of a considerable number of wells. In many cases, the production of the smaller wells has declined, and at the present time will hardly warrant the expenditure of a large sum for building new pumping plants. It is quite possible that operations will be suspended at wells of this class, and that the production of the district may show a still further decline in consequence. There are also several producing wells, which have not been profitable, owing to the fact that when oil was over-abundant, some of them took long contracts to supply oil at very low prices, and when the wells ceased to flow, and it became necessary to pump, these contracts were filled at a loss. It may be noted here that the decline in the production of oil, from this district, has had quite an effect on fuel conditions in the Southwest. The supply of fuel oil has been less abundant than it was, and the price has increased in corresponding ratio. In some cases indeed, it has been difficult for concerns to obtain the oil which they needed, and they have been forced to go back to the use of Texas coal or lignite. The history of the Beaumont oil-field has been a somewhat sensational one, and while the production may continue for some time, it has not fulfilled the expectations that were originally entertained of the future of the region.

⚒

INVESTORS IN the mineral and metallurgical industries of the United States received in April dividends amounting to $5,505,045. Those who are preferred stockholders in the big combinations secured the bulk of these dividends, although a large sum has also been paid to smaller investors. Three copper companies disbursed $575,000; 26 gold, silver and lead mines, $1,790,918; one quicksilver property in California, $30,000, and one zinc mine, $12,402; making a total of $2,408,320. Of the balance of $2,996,725, or 54.4 per cent, there was credited to four iron and steel concerns, $677,120; four coal and coke, $1,025,083; eight petroleum, $68,127, and eight chemical and mineral companies, $1,226,395.

With the $5,505,045 disbursed in April the dividends since January 1st amount to the grand total of $51,347,221. This is somewhat less than last year, as fewer gold mines and coal and coke properties have reported. On the other hand, however, there have been more payments by close corporations, which do not publish their profits.

In addition to the above, $265,851 gold was paid in April by 10 Mexican mines and metallurgical works, $15,000 by one Central American gold mine, and $305,600 by three Canadian industrial concerns. Since January 1st the Mexican companies have paid $872,327; Central American, $60,000, and Canadian, $436,200.

⚒

THE SUPPLEMENTARY REPORT ON CRIPPLE CREEK.

It is with surprise and regret that we learn of the probable abandonment of the arrangement for a second geological report upon the Cripple Creek goldfield. During the past two years the mine-owners, and others interested in the mines of this district, have importuned the authorities at Washington for a geological examination of the mine-workings with a view to the preparation of a report which should be supplementary to that of 1895, prepared by Messrs. Whitman Cross and R. A. F. Penrose. The director of the United States Geological Survey was willing to meet the request of the mining community in Colorado and, no adequate appropriation for such work having been made by Congress, it was arranged that the cost, about $7,000, should be shared by the Government and the State, as represented by the mine-owners. Matters even progressed so satisfactorily that Mr. Waldemar Lindgren, an admirable worker and investigator, was chosen to undertake the task of making the geological examination.

Now we learn that the operators of the larger mines are unfriendly to the fulfilment of this plan, and that their decision is adverse to the preparation of such a supplementary report. It is no secret that the reason for this short-sighted action is a fear lest the collection of further geological data might dissipate the sanguine hopes of a zone of secondary enrichment, as based upon the discovery of sporadic bodies of rich ore in the lower levels of certain mines, and that stock exchange values might suffer thereby.

This hardly does credit to the men who have opened up the great gold-field of Cripple Creek, for it presumes that they baulk at facts which are not favorable to exaggerated estimates of mine-values. It is a distinctly backward step as regards intelligent mining. The miner wants the truth, and he rarely hesitates to sacrifice an irridescent theory to brutal fact, whether that theory emanate from professor or superintendent. This, assuredly, is the only sure foundation for an industry and therefore we, in sharing with the mine-owner the keenest interest in the prosperity and success of our mining

regions, feel it necessary to protest against a course of action and a line of reasoning, which alike appear to us to be calculated to injure the best interests of legitimate mining.

⚒

ANOTHER MISLEADING PROSPECTUS.

"The earth hath bubbles as the water hath,
And these are of them."

The Mexican Mining and Exploration Company has issued a prospectus which bears the appearance of being designed to deceive the unwary. By enlisting the services, as directors, of several politicians of high rank and an admiral of renown, the promoters are likely to succeed in getting subscriptions to an enterprise which is heralded in terms calculated to incur the reprobation of those who desire the advancement of legitimate mining.

It is claimed, as is usual in a prospectus of this kind, that the mines in question are situated upon a lode celebrated for productiveness. In this case the Veta Colorada is used as an alluring reference, but as a matter of fact the property of the Mexican Mining & Exploration Company is, we are informed on good authority, fully 40 miles distant from this great vein, which was recently described in our columns in a special article dealing with the district of Parral. The Veta Colorada is mentioned as having been followed for 80 miles on its strike, while it is recognized among capable engineers that its known length is about 14 kilometers, beyond which limits it becomes lost as a defined ore-bearing fracture.

The description of the placer ground is quite unworthy of a serious document. Assays showing "an average of over $400 per cubic yard" are quoted, and it is said that "as high as $3,200 per cubic yard was obtained." The ground, we are credibly informed, warrants no such statements, which, in themselves, bear the imprint of absurdity. The Conchos River District has already been the scene of several failures due to mistaking occasional small patches of gold-bearing gravel for extensive deposits of a profitable nature; in any event, ground having an average value such as is stated in this prospectus would not await the organization of any mining company. Even "the poor Indian" with "untutored mind" could get gold from such a gravel, much more then the Mexican native who is not unfamiliar with prospecting. Nevertheless, even such exaggerations as we have quoted may entice those who are entirely inexperienced in mining.

The systematic development, to which the prospectus refers, resolves itself into scattered scratching of an inconclusive kind; for we are informed that it is not true that the ground has been properly tested by the company. A copper vein 180 ft. wide, an average sample from which carries 29 per cent copper, is another statement which is unfounded and misleading—to put it mildly. An attractive air of precision is given to the report by references to mineral species, but the names are misspelt and the minerals are incorrectly described.

The exclusive right to mine and explore (though for only a few months) within an area of 165 square miles, the discovery of ancient Aztec mines, the statement that the discoveries of gold made are the most important since 1849, the promise of a large city to be built and a prospective real estate boom of colossal proportions, the suggestion that certain railroads will pass close to the properties when, as a matter of fact, they are known to give them a wide berth, the references to a large river available for agriculture and placer mining in a region notoriously arid—these are all parts of a prospectus which, while it must seem only silly to well-informed men, is yet likely to beguile the business man who thinks it well to be careful in everything he undertakes—except mining. Therefore there is a possible need for the warning given in the foregoing criticism.

⚒

EVEN METHUSELAH DIED.

We have published a series of contributions to the discussion of the problems arising from the proposed sinking of shafts to cut the Main Reef series on the Witwatersrand at depths of from 5,000 to 8,000 ft. While this discussion has covered the main questions connected with mining explorations to be carried out at levels deeper than any as yet attained by modern engineering, all those who have taken part in the debate have been strangely silent in regard to one feature, which, from the point of view of an onlooker at New York, seems vital, namely, will the ore at these great depths prove rich enough to warrant the tremendous expenditure entailed by the shafts and equipment thus contemplated?

In his excellent book on the "Deep Levels," Mr. G. A. Denny, who, by the way, also avoids the awkward question of values at great depths, gives data which warrant an estimate of a million dollars as the cost of the sinking and equipment of a shaft to a depth of 5,000 ft. It is safe to say that shafts approaching 8,000 ft. in profundity will cost fully two million dollars. Even this amount, however, is not overwhelming, by any means—having regard to the scale of operations contemplated—provided that the ore continues as profitable as it has been from the surface to, say, 1,500 ft., measured vertically.

Our readers are aware that the proprietary owning claims which cover the croppings of a reef is called an "outcrop company." As the South African laws do not recognize extra-lateral rights, and the reef dips southward, the outcrop company can only follow the ore to a certain line vertically underneath its southern boundary. Beyond that line the dip carries the ore into adjoining property—the first "Deep-Level." In turn the latter's rights cease southward as the dip carries the reef into the next property, the "second row" of deep-level mines. And so on. The outcrop mines were, of course, the first to start operations; since then work has been begun on the first row of deep levels; in many instances the second row is now being exploited, while, finally, in two or three cases even the third row has been tapped, the distance from the outcrop, and the consequent depth of sinking, varying according to the location of the claims. To this it may be added that as the consolidation of claims makes blocks of ground of irregular shape, the distance from the outcrop of the successive deep-level shafts varies between wide limits.

Of the results to date it is only necessary to say that the outcrop companies and the first row of deep levels have demonstrated the Main Reef series to be the most wonderfully uniform gold lode ever mined by man. But several of the deeper mines have proved disappointing to an extent sufficient to emphasize the fact that while the "banket" may be as uniform as a coal-seam, even a coal-seam will eventually pass into shale of little value as fuel.

The producing deep-level mines tabulated by Mr. Denny have vertical shafts ranging from 615 ft. to 1,608 ft., the average being about 1,100 ft. These are "deep" only in technical phraseology, because they occupy territory on the underlie of the reefs, the upper parts of which are owned by "outcrop companies." Returns obtained up to date from actual milling operations are manifestly of little value in forecasting the results to be expected at depths of 5,000 to 8,000 ft. In the calculation of probabilities 1,100 ft. is to 8,000 ft. as the vision of the unaided eye is to a telescope. The fact is, the term "deep-level mine," which at Johannesburg is used in distinction to "outcrop mine," has a misleading sound, and does not at all necessarily imply *deep mining* in the ordinary sense. It is doubtful if this is appreciated sufficiently.

However, there is other evidence. Eleven bore-holes have been put down to depths of over 2,000 ft. Two of these—the Turf Club holes—cut the Main Reef series at 4,825 and 4,845 ft., respectively, with results ranging from 6 to 10 dwts. per ton, and widths of 34 to 45 inches. The working cost at 12 of the so-called "deep-levels" averages 6½ dwts. But this does not allow for losses in treatment. A yield of 6½ dwts. per ton is equivalent to gold contents of slightly over 8 dwts., which then is the amount to be deducted from the assay in order to arrive at the profits. Therefore, having regard to the much greater depth, and consequent larger expenditure in equipment, an ore carrying between 6 and 10 dwts. at 5,000 ft., does not represent much profit, if any. But it warrants a certain amount of exploration.

The data obtained from the two deepest holes have been quoted. The others have given varying results. At 3,309 ft. the Cinderella bore cut, in February of the current year, a body of banket having, with partings, an aggregate thickness of 16½ ft. Only 4 ft. of this was of payable grade, and the 4 ft. averaged 9.16 dwts. Another bore-hole, also over 2,000 ft. in depth, cut 36 ins. of banket at 2,960 ft. This averaged 8 dwts. A fifth gave 14 ins. of 17-dwt. ore, which is equivalent to a stoping width of about 6 dwts. Three other holes gave very low assays, and the remaining three reaching below 2,000 ft., penetrated into disturbed ground, failing to cut any reef. While those last mentioned did not give direct evidence of poverty, they indicate that the irregularities of structure encountered in the upper levels will recur in depth—where, however, they will become a much more serious factor.

Of course, drill-holes are proverbially dangerous. Indeed, one might almost say that drill-holes have a depressing habit of going through the poorest places in a lode or vein. Nevertheless, in default of other evidence, their testimony must be heeded. In so far as they throw light on the future of deep mining on the Rand they hold forth no brilliant promise, the ore cut by them, even in the six fortunate holes, averages, for a stoping width of 4 ft., about 8 dwts., which is equivalent to an extraction of 6½ dwts. per ton.

However, to us there seems to be a much stronger reason for scepticism concerning the uninterrupted persistence of pay-ore, ore capable of yielding a good margin of profit, to such tremendous depths as those contemplated in the discussion on winding plants. A vertical depth of 8,000 ft. means a distance from the outcrop, as measured on the average dip (26°) of the reef, of over 18,000 ft.!

All the experience of mining is dead against the supposition of a maintenance of values over any such extraordinary range of lode surface. Mines get poor sooner or later, just as surely as men grow old. Even Methuselah died. It is a fact that the most persistent metal-bearing veins in the world, namely, those of the Lake Superior copper region—built up of conglomerate also, like the Rand banket—have at last begun to show signs of a change in character and a concomitant impoverishment. These mines have attained a vertical depth of a little over 5,000 ft., equivalent to 8,000 ft. from surface as measured on the vein. Of other deep mines, on the Comstock, at Bendigo, etc., it is needless to speak. Let the unthinking repeat the old fable that mines become richer in depth, but knowledgeable engineers do not need to be lectured on that point. Is not this brutal fact being evaded by the professional men who are directing the work on the Rand?

This important subject is broached with no desire to underrate the resources of the great Main Reef series. We appreciate fully the fact that never has gold mining been placed on so sound a basis as at Johannesburg, and we recognize that only those who have had a wide experience can really understand the difference between the hazards of an ordinary mining venture and the safe investment furnished by the established producing mines of the outcrop and first row "deeps" of the Rand. There never were mining enterprises which assured so certain a return of capital and interest. But has not the inference, as regards future operations at six or eight thousand feet, been overdrawn, and is it not time to face the facts, in particular, as presented on the Rand, and in general, as furnished by other regions, and recognize that the rim of the synclinal basin affords better prospective chances than the long shots at the great depths contemplated in the discussion to which we have made reference?

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MARKET CONDITIONS.

While the undertone of the metal market continues strong, the past week has been in some respects a very quiet one, and business has been somewhat less active than for several weeks past.

Copper remains very quiet, with quotations rather nominal, and, in fact, the sale of occasional lots has practically made the market for the time being. At the same time, the large producers, who are generally well sold up to the end of June, are not taking business at lower rates, but are, as a rule, declining to make sales. Spot metal is scarce and sales are limited, as we have said, to occasional lots. There are no stocks to speak of in sellers' hands. Large consumers who provided for their May requirements—some of them for June also—are not upon the market at present, but consumption continues at a high rate, and they will doubtless be forced to come into the market again for supplies before very long. In London the market for standard has been somewhat weak, and bear speculators had the best of the situation for a few days. A recovery is recorded, however, just as the week closes. Actual business abroad has been on a somewhat limited scale, as consumers are not buying until the market is more settled. The lower quotations have been mostly for standard copper, best selected remaining steady.

The tin market at present is suffering from an over-supply of spot metal. The recent large arrivals have rather overstocked sellers. Consumption is good, however, and the surplus will doubtless be gradually absorbed, especially as shipments from the Straits for the month have been rather low.

While the demand for lead continues steady and consumption is on a large scale, the sharp drop in the London market brought prices down close to the point at which it would pay to import lead here at recent quotations. The chief seller has, in consequence, dropped prices 30 cents per 100 lbs., bringing them back to the point held before the last raise. They are still higher than they were during the whole year 1902.

Spelter is firm; smelters have not been pressing sales, but rather holding back. Both brass manufacturers and galvanizers have been quite active buyers. Prices are consequently strong. Prices of zinc ore in the Joplin market continue high, although the chief buyers have made some attempt to secure a reduction.

VICTOR M. CLEMENT.

Silver continues firm and will doubtless hold fairly well as long as the purchases for Philippine currency continue. Sales to India have also been fair and the market looks more encouraging than it has for some time. The French coinage orders have, it is understood, been filled.

In the iron market a waiting tendency continues to be felt, and large buyers seem to be holding back in hopes of securing concessions. On the other hand, makers assert that they can see no reason for lower prices, and are apparently anticipating a heavy demand for the remainder of the year. Both in raw and finished material manufacturers are generally well sold up for the third quarter, and a number of them for the fourth quarter of the year also.

The Western coal markets are quiet. Lake trade has now fairly begun, and from this time on coal will be rushed to the Northwest as rapidly as possible. In local markets, the demand for domestic coal is, of course, very light, and manufacturers are generally getting all the supplies that they need.

The seaboard bituminous trade continues quiet, and even dull. Receipts at tidewater continue liberal, and prices for ordinary grades of Clearfield have fallen again, until they are about as low as at this time last year. Transportation and car supply are generally sufficient for producers' needs.

In the anthracite trade the troubles at certain collieries are being adjusted, and the output is liberal. Demand is widespread and heavy, and dealers will be unable to get as large tonnage of coal as they wanted at April discounts.

⚒

VICTOR M. CLEMENT.

It is with sincere regret that we have to chronicle the death, on April 26th, of Victor M. Clement, at the age of about 47 years. He died at Saltillo, Mexico, from blood-poisoning. His wife was with him.

This sad intelligence will come as a shock to men in remote parts of the world, for Mr. Clement did good work as an engineer in the Coeur d'Alene, at Johannesburg, in West Australia, in Central America, in Mexico and many other regions whither he was called on account of a reputation for sound sense and seasoned experience. Starting life with an ordinary school education, Mr. Clement was early apprenticed to his profession, and on becoming superintendent of the Bunker Hill & Sullivan Mine at Wardner, Idaho, he won distinction for capacity and courage during the turbulent period which made the Coeur d'Alene so infamous; he was one of the first of our Western men to accompany Mr. J. Hays Hammond to the Transvaal, where he became manager of the Simmer & Jack Mine. In January, 1896, he shared the lot of the leading engineers on the Rand in undergoing imprisonment at the time of the Jameson fiasco; afterwards, when liberated, he returned to this country and became consulting engineer to the properties controlled by Capt. De La Mar. Subsequently he became interested in mines situated near Mazapil, in the State of Zacatecas, Mexico, and on this, his last, visit to that country he fell a victim to circumstances such as mining men have often to encounter, in becoming suddenly ill amid conditions unfavorable to proper medical treatment.

The profession can ill spare such men as Clement, a true type of American manhood, a graduate from the school of experience, a skilful engineer, a courageous superintendent, and above all, a true friend in all weathers.

In countries far apart, to many a man, busily engaged in the absorbing details of his daily labors, there will come a moment as of a sudden silence amid the noisy activities of life, when he hears that this friend has crossed the range.

When capitalists are numerous and capital is abundant, work is plentiful and wages are high. Capital and labor are Siamese twins, which can only be separated by killing them both.

As capital becomes abundant the interest or profit which it can obtain becomes lower, on account of competition among the capitalists themselves.

Capital competes with capital, labor with labor; but capital cannot compete with labor any more than labor can compete with capital. Competition can only exist between factors of the same order.

Capital is result. Labor is effort. Capital is a product of previous effort, while labor is present effort.

Proclaim human equality as loudly as you like. Witless will serve his brother.

DISCUSSION.

Readers are invited to use this department for the discussion of questions arising in technical practice or suggested by articles appearing in the ENGINEERING AND MINING JOURNAL.

COPPER AND TELLURIDES.

The Editor:

Sir.—The occurrence of copper ores underlying tellurides, which has been noted lately at Cripple Creek, is not new. In the Golden Fleece Mine, in Hinsdale County, Colorado, which had a wonderful body of telluride ore and for many months sent to market one car-load per month worth $40,000, the telluride ore was succeeded by a narrow vein of copper ore (bornite, if my recollection is correct) which was about 6 ins. thick and carried about 60 oz. of silver per ton. I have heard that a lower body of telluride, much smaller than the upper body, was found, but have not seen it. I mention this occurrence because there may be some association of copper and telluride ores, which is at present suggested only vaguely, but may have importance. It should be noted too that the rich telluride ores in the upper part of the Slide Mine in Boulder County, Colorado, was succeeded in depth by pyrite containing about $7 gold per ton.

JOHN A. CHURCH.

Clifton, Ariz., April 18, 1903.

COMMERCIAL CYANIDE.

The Editor:

Sir.—Apropos of an abstract of a paper on "Notes on Commercial Cyanide" by Mr. Whitby, appearing in your issue of February 28, and of a discussion on this by Mr. Doveton in your issue of March 28, and referring to the latter first: Mr. Whitby infers that the existence of alkaline sulphide in commercial cyanide is rather an advantage than otherwise, in as much as it precipitates the zinc in the working solution. The question is, does a complete precipitation of the zinc take place? Or, to put it clearer, by adding a soluble sulphide to a working cyanide solution containing zinc in access of that required by the equations:

$$Zn(OK)_2 + S_2 + 2H_2O = ZnS + 4KOH$$

and $$K_2Zn(CN)_4 + K_2S = ZnS + 4KCN$$

Is all the sulphur precipitated as ZnS?

Having to work with solutions up to 0.75 per cent KCN in a silver cyaniding proposition, I have been somewhat troubled by an accumulation of zinc in my solutions, and acting on the above reactions I endeavored to precipitate the zinc by means of sodium sulphide.

What happened was this: The zinc was only precipitated in an excess of sulphide solution. In other words, the above reactions are not complete ones, and at one and the same time the sulphide and zinc may be in solution. The excess of the sulphide may, however, always be thrown out of the solution by means of soluble lead salts.

This, I think, bears out the experience of Mr. Doveton. But Mr. Doveton goes further and states that "The presence of zinc sulphide is equally obnoxious," he says he has proved this; but I suggest that it is not the zinc sulphide, *per se*, which is obnoxious, but rather that repeated washes of alkaline cyanide solutions re-dissolve this freshly precipitated zinc sulphide according to the equation:

$$ZnS + 4KOH = Zn(OK)_2 + K_2S + 2H_2O$$

and that this potassium sulphide exerts the baneful effect noticed by him.

With regard to the phrase "per cent pure" guaranteed by the manufacturers of commercial cyanide, and so ably dissected by Mr. Whitby, during the last 10 years, and, of course, in consequence of the extensive use of KCN in gold extraction, manufacturers have brought the commercial cyanide from a product which was apologetically called potassium cyanide, to a product guaranteed 98-99 per cent pure. All credit is due to them for this. But at this stage they have stopped, nay, I might say, gone backwards, and by mixing together sodium and potassium cyanide are making a mixture which, without a complete analysis one might at first sight think was 98 per cent pure KCN, but which in reality contains the —CN radical equivalent to 98 per cent KCN, but not necessarily 98 per cent of potassium cyanide.

The per cent of KCN in a commercial sample is generally obtained by the well-known silver nitrate titration; a method which essentially measures the —CN radical.

The molecular weight of KCN is 65, that of NaCN being 49. In other words, the manufacturers may turn out an article, containing 73.9 per cent NaCN, which, by the above method of determination, is equivalent to 98 per cent KCN, leaving room for 26.1 per cent impurity instead of 2 per cent, which a guarantee of 98 per cent naturally implies.

An analysis of a commercial cyanide guaranteed 98 per cent pure will prove interesting: —CN, 39.2 per cent; K, 3.4; Na, 44.0 unestimated, 13.4.

Assuming that the whole of the potassium is combined with —CN, then there is an impurity of 24.6 per cent. There is more than sufficient sodium to combine with the whole of the —CN radical, and the only conclusion to draw is that the product has been nicely adjusted to an equivalent 98 per cent KCN.

In view of these facts it seems to me that the time has arrived when cyanide managers should demand something more than a guarantee of 98 per cent pure, which, as shown, leaves room for adjustment, an adjustment the advantage of which is being taken by the manufacturers.

Either a complete analysis should be supplied by the manufacturers, an easy matter, or a guarantee of the —CN radical. The former is the better.

If NaCN is as efficacious as KCN for the solution of the values, and other things being equal, then it is only a matter of time when it will displace the use of KCN, since 1 ton of NaCN contains as much of the active —CN radical as does 1.32 tons of KCN.

I believe I am correct in saying that the Scottish Cyanide Company is turning out sodium cyanide only for gold extraction.

FRANK W. OLDFIELD.

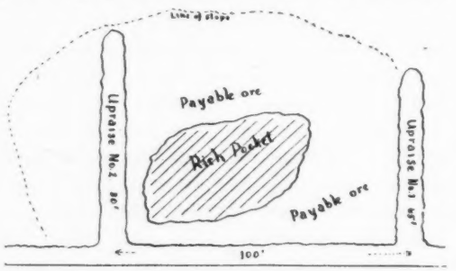
Chinipas, Chihuahua, Mexico, April 8, 1903.

ORE DEVELOPED.

The Editor:

Sir.—Referring to the discussion regarding "Ore Developed," kindly allow space for this bit of experience from actual practice.

There had been blocked out on three sides, a piece of ground as shown in sketch. The result of



sampling showed the block to be of payable ore, though with but a small margin of profit remaining, above mining and milling expenses. Upon stoping the ground, there was encountered a pocket of ore within 6 ft. of the upraise No. 2 which carried a value three times that of the result of sampling the block, and which amounted to about one-third of that of the whole piece of ground.

This is a reverse, though more desirable case than the ones referred to in Mr. Collins' article of February 24, in which the ground might have been poorer instead of richer. It, however, illustrates the same principle of uncertainty, with which we have to deal.

JOHN C. TREADWELL.

Sahuayacan, Mexico, April 6, 1903.

GEOLOGY IN PRACTICAL MINING.

The Editor:

Sir.—The recent paper, in the issue of April 11, 1903, contributed by Mr. J. E. Spurr, takes up an interesting side of a debated question. The term "Mining Geologist" is one rather infrequently heard, and the name is not attended with great weight, in the United States, at least. It has perhaps not attained to the dignity which it deserves, and it is well to look to some of the reasons why an occupation, theoretically so important, has been held in what may be called a mild species of contempt by the average miner, who deals daily with the bread-and-butter side of geology.

The miner, the *Bergmann*, the "mountain-man," has on his side the advantage of antiquity. His profession is as old as the hills, figuratively speaking. Primitive man found stones on the hills, and he put them to use. As soon as his selective faculties came into play it was inevitable that he should use hard stones for some purposes, soft stones for others. At a later period, when the discovery of metals, gold and copper, for example, was made, he made use of metals. After his discovery of fire, and its properties, he was able to turn to his uses those metals which he found in the form of ores—iron, tin, silver, copper in increased amount, nickel, antimony.

Primitive man did not hunt stones, metals, ores, for their scientific interest. With the exception of the varieties which he used for personal ornamentation, his interest in them was purely utilitarian; utility for the purposes of defense, the chase, to assist him in cutting his wood, his meat, to provide vessels for his cooking, and the grinding of cereals. He did not speculate on their origin, nor did he concern himself as to the laws governing their distribution over the surface of the earth. His daily needs required that he should "hustle" to take advantage of the limited resources at his command, and so long as the local supply of material held out, the secrets of nature had no further interest for him. When the supply was exhausted in a given place the impuulse to explore exerted itself.

Archaeologists, by their continual researches, are carrying the dawn of history back so far that it is unsafe to attempt the assigning of a definite limit to the age of human art. If ten thousand years be taken as the provisional limit of time during which human beings have been possessed of an ability to use the earth's mineral resources, it follows that for the same length of time the mining industry has been prosecuted. Proof is constantly brought forward to show that the mining of metals is exceedingly old. The arts of reducing ores, and forming alloys, although not as old, are still of high antiquity.

In the recent interesting paper by Mr. Charles J. Alford, "Gold Mining in Egypt" (*Transactions* of the Institution of Mining and Metallurgy, Vol. 10, 1901-2, page 2), it is shown that gold was mined in Egypt in very ancient time. A personal letter from Professor the Rev. A. H. Sayce, quoted by Mr. Alford, states that gold was plentiful in Egypt 2500 B. C., and Prof. Sayce is of the opinion that a large portion of the annual revenue of the second Ptolemy, at one time 14,800 talents,[1] was from gold mined in the Egyptian desert.

In Mongolia and southern Siberia, bronze implements of an alloy of copper and tin, namely horse-trappings, urns, mirrors and ornaments, found on the Steppe, date back certainly before the Christian era, and accordingly to some investigators, to 1500 years before. In "Nickel; Historical Sketch" (*Proceedings* Colorado Scientific Society, Vol. IV, page 378), it is stated that Greek coins of 235 B. C. were made of an alloy of nickel and copper closely resembling that employed to-day.

A list of examples, such as the foregoing, might be almost indefinitely continued, but it is not the purpose of this contribution to give a history of mining. Enough has been said to indicate of how

[1] Over twenty million dollars.

great an age must be the profession of the miner. In contrast, how recent of birth is the profession of the mining geologist. Sir Charles Lyell, although he makes it clear that some speculations relating to geology have formed a part of human thought since the time of the hymns of the Vedas, of Indian antiquity, yet he expressly states ("Principles of Geology," chapter 4, page 67), that Werner was the first to point out the application of the principles of geology to practical mining. This was after Werner was appointed professor of mineralogy, in the Freiburg School of Mines, in 1775. "The phenomena observed in the structure of the globe had hitherto served for little else than to furnish interesting topics for philosophical discussion." It is possible that earlier men, of the type of Leonardo da Vinci, may have, in their own minds, conceived the bearing of geology on mining and quarrying operations, but no records of their writings show that the matter received their serious attention.

The fact is, then, apparent that the miner has to his credit a period of some thousands of years to support the value of his profession. The mining geologist can refer back only one hundred and twenty-eight years to assert the necessity of his. In his relations to the miner, he is like a very little boy trying to give advice to a very old man. Admit that this is the age of young men, of young ideas, yet there is much to be said for the miner. Had the mining geologist been purely a development from the miner, his case would be stronger. But, I take it, in the great majority of cases, he is not a development. He is rather an intruder on the province of the miner.

If one is to believe in the inheritance of tendencies it is conceivable that in certain mining centers, as, for example, in Cornwall, a class of men exists which is composed of rock men, just as in other parts of the world under different conditions there may be developed a class of wood men. It is said that a Russian peasant, dwelling in the timbered portion of the empire, will, for a ten-kopek piece, lay his left hand, with fingers spread, on a board, and with his axe grasped in his right hand, will make an axe-cut in the board between each of his outstretched fingers. It is also affirmed that a boy of Cornwall, put fresh into the mine, will strike true on the head of a drill with a hammer before the first day of his work is finished. In either case the act implies generations of stored-up experience. In a mining community, the influence of environment is also strong. It is a well-known fact, exemplified in any mining camp, that the plays of the children are mining plays. They are forever sinking miniature shafts, driving tunnels, sluicing gravel, and improvising diminutive pumps, hoists and tramways. These boys, growing up, become miners, and have as their working capital not only inherited experience, but the indelible tendencies acquired in childhood. The miner, be he from Cornwall, from Saxony, from Pennsylvania, or from Mexico, must of necessity have a certain mining intuition. Put the Cornish miner into any part of the world, and set him at work on a vein of metal. His knowledge of the lay of the ore, the strike of the vein, of shoots, of courses, of ore against ore, is innate. It is fundamental, representing the acquisition of his own lifetime plus that of his mining forefather's.

Mr. Spurr says, "Every miner . . . is a mining geologist to the best of his ability." Further, ". . . there is a good deal of sound geology to be learned from those who come into close and constant contact with natural phenomena." It is a pity that it cannot be said that every mining geologist is a miner, to the best of his ability. I would suggest that the bulk of the information of mining value possessed to-day by mining geologists has been acquired from the miner, subsequently to their encroachment on the miner's field. And I would ask if the distrust with which the miner is apt to regard the dicta of the mining geologist is not in large measure justifiable in view of the conditions under which the two classes have been developed.

It should be remembered as an additional point that geology, as a science, was developed originally by a leisure class; by a class of persons belonging to an old-world nobility, bound by law and tradition to hold itself superior to another, a laboring class. Under social conditions obtaining in the eastern hemisphere the geologist was, and to a considerable extent is to-day, of the upper, the leisure class, while the miner was and is of the laboring, the subject class. To-day the geologist, both in Europe and America, is brought more nearly in touch with the money-getting side of life, but he is not ordinarily dependent on the economic phase of mining to the same extent as is the miner. The mining geologists of America who are actually engaged in taking money from the ground are few. Their income in most cases is fixed by other means. They are either possessed of private fortune, are in Federal or State employ, or are in the service of universities receiving their pay as a fixed salary. This salary is naturally independent of the value of their work judged with reference to any individual mining property. Geologists deal with broad problems, and they are apt to overlook the necessity of the miner to get his returns from the single stringer of ore in which he may be operating. In other words, the occasional need for dividends, plainly apparent to the miner, is less apparent to the geologist. It is not so extraordinary, then, from the above very practical standpoint, that the miner, the mine foreman and the mine manager, are inclined to deride the worth of the mining geologist.

To recapitulate, the miner has on his side, first, antiquity; second, inherited experience; third, his right as a producer of wealth, as grounds upon which to found his protest against the encroachment of the mining geologist on his realm. On the other hand, the geologist cannot urge the antiquity of his profession, has little, if any, inheritance of experience, and so far from being a producer, is usually a consumer of the wealth produced. It is possible that a time may come in the future when the science of ore-deposits will become so nearly exact, when the laws governing ore-deposition may become so well formulated, that the mining geologist will become an indispensable aid to the miner. At present the mining geologist, to be of value, must include in his training, in so far as possible, the work of the prospector and the miner. The man who prospects or operates a mine, having the data acquired by the comparative study of ore deposits at his command, is a better prospector and a better miner than he who is in ignorance of these data. The value of such information under certain conditions can hardly be overestimated. The geologist of to-day, however, who has not been face to face with the difficult and often bitter experiences of the mine operator, is in a poor position to command respect, and he cannot complain if his opinions are set aside and his really valuable knowledge is disregarded.

C. W. PURINGTON.

Denver, Colo., April 17, 1903.

WATER IN VEINS.

The Editor:

Sir.—When reading your article on Water in Veins in the JOURNAL of March 14, it occurred to me that some data concerning pumping at the Gagnon Mine, Butte, Mont., might be of interest.

I quote from my report to the Colorado Smelting & Mining Company for the year 1899, as follows: "The greater portion of the water pumped from the mine comes from the 1,000-ft. level and above. On December 31 a careful measurement was made of the flow of water per minute, with the following results:

From the 500 ft. and 800 ft. levels, carried down to 1,000 ft. level	1.03 gal.
1,000 ft. level, South cross-cut	90.71 gal.
1,000 ft. level, West drift	27.33 gal.
1,300 ft. level, West drift	20.84 gal.
1,400 ft., 1,500 ft. and 1,600 ft. levels, carried down to 1,700 ft. level	4.37 gal.
1,700 ft. level and sump	2.80 gal.
1,800 ft. level and sump	7.00 gal.
Total	154.08 gal.

It was our practice to gather up the water as much as possible upon the different levels, but, of course, there was more or less seepage and drainage. You will note that the heavy flow is from the South cross-cut on the 1,000-ft. level. This cross-cut was driven some years before for prospecting purposes, and the exploring of a south vein which was known to exist in our ground. My recollection is, that when first driven, the flow was about 150 gals. per minute. At the time of my report, work had been discontinued there, and as no one else was operating in the immediate vicinity upon that particular belt, in a way it might be considered virgin ground, at least as much so as any other tract near the heart of the Butte District.

P. WISEMAN.

Los Angeles, Cal., April 14, 1903.

AMORPHOUS PRECIPITATES.

The Editor:

Sir.—I am tempted to make a few comments upon the contents of a communication from Mr. Matt W. Alderson, contained in your issue of March 7 last. Mr. Alderson makes the following statements, and upon them bases his argument:

1. He says that as ordinary precipitates harden, they "make a product familiarly known as micro-crystalline."

2. He asks if it has ever "been possible to make an amorphous product in the laboratory in the wet way."

3. He says that "gem-stones generally are amorphous," and "quartz deposits generally are amorphous."

That his data are incorrect and his argument therefore unsound will perhaps appear from the facts that (a) the mere hardening of a chemical precipitate has nothing to do with its becoming crystalline, whether micro-crystalline, crypto-crystalline or coarsely crystalline. It is impossible to tell by the naked eye whether a precipitate is crystalline or not; but the chief determining factor is the element of *time*. The fact that a given precipitate is not crystalline is no indication that a crystalline product may not be formed under the same conditions and by the same reagents; but the very fact that a precipitate is formed is in itself an indication that a crystalline product will be formed if the operation proceeds sufficiently slowly. (b) The word "amorphous" means without form, that is, without crystalline form and structure. That Mr. Alderson has no conception of the signification of this term, which he uses so freely, is evident when he says that "most gems are amorphous." Every mineralogist knows that the term "amorphous" is the last that could be properly applied to the most perfectly crystalline substances in nature. He speaks of "amorphous quartz" without appearing to know that there is no such thing, and that the very use of the term "quartz" implies a substance that is not amorphous. (c) Every chemist knows that most of his precipitates formed in the wet way are amorphous, because of the rapidity of their formation; but that with sufficient care many of them may be induced to crystallize.

It would require too much of your space were I to endeavor to mention here all of the minerals that have been formed in the laboratory in the wet way. In fact, I have perhaps already given the subject more attention than it deserves. But this communication of Mr. Alderson's so well illustrates a common variety of unscientific criticism of scientific subjects, that I could not refrain from pointing out a few of its fallacies.

HORACE V. WINCHELL.

Butte, Mont., April 16, 1903.

ERRATUM.—In Mr. Metcalfe's paper on "Width of Furnace Relative to Tonnage," in our last issue, the analysis of slag given in the third column, page 624, "CuO, 18 per cent," should read, "Cu, 0.18 per cent; while "CuO, 21.8" should read "CaO, 21.8." In the first column, page 625, "CaO" should be substituted for "CuO." In the first analysis on page 624, "CuO, 16 per cent," should read "Cu, 0.16 per cent."

THE SAMPLING AND ESTIMATION OF ORE IN A MINE.—X.

By T. A. RICKARD.

(*Continued from page 628.*)

COLLATERAL EVIDENCE.

Of all the collateral evidence, likely to aid the engineer in a correct diagnosis of the condition of the mine he is examining, none is so useful as that derived from a study of the surrounding district. Mines situated in the same district are apt, on account of an identical geological environment, to exhibit similar symptoms and to suggest like possibilities. The general study of a region, therefore, is a useful preliminary to the investigation of a particular mine. Moreover, there is, I am glad to say, a certain spirit of *camaraderie* among professional men of the right sort which will enable a stranger to obtain many useful hints from resident engineers if he is properly made known to them.

The characteristics of ore-deposits within limited areas are often well marked; in one case persistence, without probabilities of bonanzas, is the rule, as on the Rand; in another case an irregular distribution of values is to be expected, as in most silver-lead deposits in limestone and also in many rich telluride veins where secondary enrichment has been at work; again, certain lines of faulting and well-defined contacts between sedimentary and eruptive rocks may be recognizable as factors in determining the place of rich bodies of ore, as is illustrated by the Aspen and Rico districts in Colorado.

Another very important factor, in influencing the relative richness of a lode in depth, is the position of the ground-water level. No engineer can afford to disregard it. Two opposite cases may be cited. In certain arid regions of the southwestern part of North America, which it would be invidious to specify further, the persistence of rich ores coincides roughly with the zone of oxidation. I recall a well-known mine which, at the time it was examined by several reputable engineers, exposed an ore-body nearly 1,800 ft. in length. This was the length of the ore traversed by the longest level, which was also the deepest. See Fig. M. Both ends of this level were, however, still in ore. Three winzes proved the ore for a further depth of about 30 ft. The upper workings contained carbonates of lead and iron-stained quartz rich in the precious metals. At the third level there was evidence of the edge of the oxidized zone, for sulphides predominated. All of the winzes left off in sulphides, of average tenor as regards gold and silver, but exhibiting a noteworthy admixture of zinc-blende amid the galena. One engineer who examined the mine allowed 50 ft. below the lowest level as ore to be estimated in appraising the value of the property, but he allowed nothing beyond the ends of the level. This was adversely criticized. However, among the reasons prompting a conservative attitude was the recognition of the fact that many gold and silver veins in that region turned into poor zinc-bearing lodes at a short distance below the limit of visible oxidation. In the sequel he was proved to be right. When, later on, the mine underwent extensive development it was found that at 45 ft. below the lowest level the ore became poor in gold and silver, but heavily charged with zinc-blende, while at the same time the lowest level ran out of the ore-body within a few feet at both ends. In this regard it is a curious fact how often good miners, especially if they are selling a mine, stop their explorations at the proper psychological moment.

The great copper region around Butte, in Montana, exemplifies another aspect of the inquiry. Very extensive exploration, prompted by the extreme richness of the lodes, has permitted of the accumulation of evidence which proves conclusively that the big ore-bodies are the result of a secondary enrichment brought about by the leaching of copper by the ground-water and its precipitation upon the sulphides of the deeper zone. The original vein stone consisted of iron pyrite, copper pyrite and, probably, enargite, while the bonanzas consist of the higher sulphides, bornite, covellite and chalcocite. Experiments have been made in the laboratory which illustrate the formation of chalcocite (copper glance) on pyrite by precipitation from a solution containing copper sulphate, such as would be the product of oxidation through the agency of the ground-water. As a result of such reactions the outcrops are poor in copper and silver, because these have been leached out; the silver appears at a comparatively shallow depth (three or four hundred feet below the surface) so as to form a zone of maximum enrichment in that metal, while the copper has been deposited deeper still, so as to form the magnificent masses of high-percentage ores which have made Butte so productive. Below these come the first-formed ores, chiefly pyrite with a little copper pyrite, without the higher copper sulphides which have enriched the overlying zone. While, therefore, the lower limit of the horizon of secondary enrichment has been passed through in some of the mines it must be added that in others the rich sulphides extend to a depth of over 2,000 ft. from the surface so that the effects of the ground-water circulation continue to a profundity quite exceptional in the experience of mining. This may be due to the intensity of the fracturing which followed the deposition of the earlier sulphides, and it may be partly a result from the open character of the lode channels which has permitted of the far-reaching penetration of the ground-water, but, whatever the cause, it renders the problem of ore-occurrence at Butte quite exceptional, particularly when compared to cases such as the one quoted in the preceding instance, in Fig. M. A novice who has sampled the shallow workings of a young mine in a region such as Butte would be likely to be misled by the low percentage of copper, and therefore enunciate an unfavorable opinion, whereas one who recognized the effects of ground-water leaching and was guided possibly by a knowledge of the changes encountered at greater depth, in a neighboring mine, would make quite a different inference. Under other circumstances in another region the occurrence of the higher sulphides, such as covellite and chalcocite, would suggest secondary enrichment and warn the engineer against counting upon a persistence of conditions which are frequently quite local.

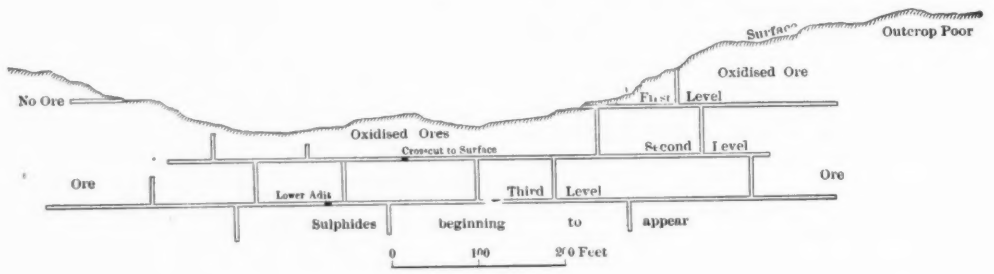


FIG. M.

Considerations such as these suggest very forcibly that keen observation and wide experience are required for the appraisement of the potentialities of a prospect.

CONCLUSION.

This discussion of the subject has emphasized one great factor in work of this kind, and that is—the personal equation. No two men set to work in exactly the same way, and no two men make exactly the same deductions from a complicated series of data. My views on the subject are those based upon my own experience—hence the inevitably limitations of my presentation of it. For this reason also I have omitted to refer to the literature which deals with sampling and estimates of ore because it would have extended this contribution to uncomfortable length, had I taken up the other aspects of the inquiry as discussed by other men. Herein lies my excuse and my apology to the Institution of Mining and Metallurgy, to Messrs. J. D. Kendall, E. B. Kirby, A. G. Charleton, W. Wybergh, G. A. Denny, S. J. Truscott, D. W. Brunton, W. McDermott and other authoritative writers.

The conclusion of the whole matter is sufficiently obvious—so obvious as to need but little further insistence. If the discussion of the methods to be applied in the sampling and estimation of ore has served to accentuate the difficulties to be encountered in the diagnosis of a mine then it will have fulfilled one of the purposes of this contribution. *"Qui va piano, va sano."* Extreme care is necessary at every stage of the work—care and experience, the experience born of wide knowledge and practical work without which a man in a mine is no better than the proverbial bull in a china shop, with a strong suggestion of a coming smash!

The old hands—the engineers who have sampled mines from China to Peru—do not need my maxims to guide them. They have lost the cheerful confidence of their apprentice days and are saturated with the experience of difficulty and doubt which have been frankly faced on a hundred occasions. To the youngster, who still has to receive his first fall and to realize that few data are absolutely certain, also that data carelessly obtained are inevitably uncertain—to him this analysis of methods of work will, it is earnestly hoped, serve as a red flag of warning. To the general reader who is usually more in sympathy with the pains of the unfortunate investor in mines than he is with the causes which may vitiate good advice from the expert, to him these *obiter dicta* will, I trust, suggest forcibly that good advice is hard to get and expensive—yet cheap indeed compared to the costly experience of entrusting onerous professional duties to the inefficient.

A GERMAN COAL MINE ACCIDENT.—An explosion occurred recently in the Konigin Louise Mine, at Ostfeld, Silesia. Eight dead bodies and eight injured men have been recovered, while 14 miners are still missing.

LAKE ORE CARRIERS.—The *Marine Review*, of Cleveland, O., says: "In the season of 1902 there was moved from Two Harbors one of the principal ore shipping ports on Lake Superior, 5,549,120 gross tons of ore. This large quantity of ore was carried down the lakes by 281 vessels. The number of cargoes was 1,149, so that the average cargo was 4,830 gross tons. This average shows how the ore trade is constantly drifting to big vessels. The great bulk of this ore was moved a distance of about 875 miles by water, as 4,665,342 tons of it was consigned to Lake Erie ports, against 883,778 tons to Chicago. The maximum cargo, 7,576 tons, was taken out by the steel tow barge, *John Smeaton*, August 14, and the minimum cargo, 1,076 tons, by the wooden steamer *Rube Richards*, October 4. The average time loading for all the vessels was 8 hours. The first clearance was the steamer *F. B. Wells*, April 2, and the last clearance the steamer *Lansing*, December 7."

Four steel tow barges loaded over 100,000 tons each during the season, as follows: *John Fritz*, 17 cargoes, 119,932 tons; *Marsala*, 16 cargoes, 112,198 tons; *Madeira*, 16 cargoes, 111,196 tons; *John Smeaton*, 15 cargoes, 107,889 tons.

HOISTING FROM GREAT DEPTHS.*

BY HANS C. BEHR.

(*Continued from page 629.*)

FLAT ROPE WINDERS.

The many existing examples of flat-rope winders may be quoted as a practical illustration of the diameter on which winding ropes may be wound without detriment when hanging down to the bottom of a deep shaft. Many of these have reel centers of only 5 ft. diameter and even less, the wires in the flat rope being about 1-16 in., so that the ratio of drum diameter to that of wire is only 960. Such ropes never give any trouble from being bent around the small reel center, the trouble with flat ropes being the wear of the stitching and the consequent necessity of frequent re-sewing. The writer has had quite an extensive experience with flat ropes, and though not in favor of them, it is only fair to state that the strands of some flat ropes have lasted out many re-sewings, and some are said to have lasted a number of years. In the 1.6-in., 19-wire rope on a 10-ft. drum, the wires will be about 0.1066 in. in diameter, and if the bending stress be assumed to follow the same law as in the flat rope the diameter around which the 1.6-in. rope might be wound, and not exceed the stress to which the flat rope wires are subjected, would be about 8½ ft. instead of 10 ft. According to Prof. Hrabak the wires in a round 6-strand 19-wire rope are less strained than those of the same size in a flat rope, when both are bent around the same diameter. The wires in the 1.6-in. round rope, on the 8½-ft. drum diameter are, therefore, less strained than those of the actually working flat ropes.

Several of the contributors to the discussion, and also the writer, have shown that moment of inertia or flywheel effect is desirable in a drum in order to secure smoothness of running and to reduce shocks. It is, however, easily possible to go too far in this, and, in fact, most of the lines of design which have been followed have led to excessively massive drums. If equality or approach to equality of end moments is desired for depths like 5,000 or 6,000 ft., the drums become very large, especially with great initial diameter. Large initial diameters are often taken in order to be able to reduce the width of the drum.

The writer's Case IX, though starting from a smaller initial diameter than in the exhibits by Mr. Jennings, which smaller diameter the writer considers admissible in view of experience with flat ropes, still gives 26 ft. diameter for the large end of the drum, when practical equality of end moments is desired. When such equality is not necessary it also becomes possible to use smaller drum diameters. But with the ordinary cone drums the width then becomes considerable. The width can, however, be somewhat reduced by constructing the drums, as done by Nordberg and others, partly conical and partly cylindrical, and a very important reduction may be accomplished by permitting the rope to wind on the cylindrical part in two layers. The writer admits that it is more desirable to have only a single layer of rope, and he is certain that this arrangement, though a very usual one with even more than two layers, will be criticised. But when there are only two layers, and the drum is grooved for the first layer, and the last part of the grooving is made rising so as to cause the rope at the end of the drum to mount easily and without shock on top of the first layer, the objection to the arrangement can be only slight, especially if the drum is sufficiently far from the shaft so that the lead of rope does not vary more than, say, 1° at the point most distant from the plane passing through the pit-head sheave and at right angles to the drum shaft. With this type of drum considerable depth can be reached, even in a single lift if desired, and without arriving at excessively large dimensions. The writer has perhaps somewhat neglected this promising type in his original paper, but he has arrived at the conclusion that it is the best type of winding drum for most cases exceeding 2,000 ft. in vertical depth. If experience should demonstrate that the sway of the long ropes with great depths is not serious, then this type of drum could also be used for depths of 6,000 ft. without reaching the excessive diameters of many existing examples of cone drums.

The writer has shown that the moment of inertia has generally only a comparatively very slight effect in extending the time of winding with a given maximum speed. A much more serious extension of the time exists with cone drums, due to the varying radius at which the ropes wind on and off the cones during the period of constant drum speed. The maximum speed can thus exist with both ropes only for an instant, with the descending rope near the end of the acceleration period, and with the ascending rope near the beginning of the retardation period. In cylindro-conical drums this effect is the less marked the smaller the proportion of the conical part. In fact, if the conical part be such a proportion of the whole that the ascending rope will reach the cylindrical part at or before the end of the acceleration period, then the cylindro-conical drum can accomplish the trip in the same time as a cylindrical drum or sheave winder, provided that the moment of inertia is about the same in both cases; a considerable difference in this, however, affecting the time only slightly, as shown before.

Mr. A. R. Sawyer, in his contribution to the discussion, briefly suggests for great depths in a single lift a cylindro-conical drum with a taper rope and a tail-rope. The writer had independently, and before reading Mr. Sawyer's contribution, arrived at the same idea, and had worked out the scheme in detail, and recently figured the cost. There is still, however, the fear that the swaying of the long ropes may become dangerous, though on account of the heavier drums and lighter rope, this should not be to such an extent as with the lighter sheave drives using the necessarily larger and heavier parallel hoisting rope and an equal size of tail-rope.

Mr. Vaughan in his contribution to this discussion has shown that, when winding from different levels with the full length of rope, cone drums would give higher initial and lower final moments, the variation from the uniform moment for full depth being considerable with great total depth. Mr. Vaughan, however, also points out that in sinking, this condition is favorably modified owing to the shorter length of rope and the lighter loads operated with.

In the case of winding from levels other than the lowest by unclutching and adjustment of drums, the effect is as if a shorter length of rope were attached at some point between the small and large ends of the drum. There is, therefore, a lower ratio of end diameters with a given length of rope to wind between these limits, than if the same length of rope were attached at the small end of the drum, which condition was also referred to by Mr. Vaughan. The condition then approaches more nearly to the cylindrical drum than if the rope were unwound from the small end.

The same change from uniformity, when winding from levels higher than the plant is laid out for, occurs also with flat rope reels as with cone drums.

FLEXIBILITY.

Mr. Jennings states on page 18 of his contribution, under the heading of Flexibility, that: "All the main winding engines of the world are made practically inflexible, the moving masses evidently being too great to be dealt with by clutches, and the Whiting system is the only one which it seems possible to render flexible for its maximum depth capacity." In connection with the last point the writer would state that there are numerous very large drum winders on the continent in which the one or both drums are loose on the shaft, and connected by some bolting or clutch device to a disc or other part rigidly keyed to the shaft. This is a well-known arrangement. By loosening one of the drums it can be rotated on the shaft so as to adjust the position of one load relatively to the other, after which the drum is again clamped to the disc. The cone drum winder for Preussen No. 2 Dortmund has a device operating on this principle. Refinements of this device are the various forms of jaw or pin clutches, by means of which the adjustment is made much more rapidly. The arrangement used with the two double connected cone drums at the Tamarack, provides for adjustment of levels by small cylindrical drums inside the cone drums, to which they are clutched or bolted. The inner drums carry an amount of rope which is paid out as sinking proceeds, the inner drums being then unclutched for the purpose of unwinding the amount of rope needed.

In regard to the statement that clutches are unable to deal with the massive drums, the writer can state that large band friction clutches are used on the largest drums at the Calumet & Hecla mines, and in one instance under perhaps the most trying conditions to which such clutches can be subjected. The following information about the plant of the Calumet & Hecla is taken mostly from an article by Prof. A. Riedler, entitled "Die Maschinen-Anlagen der Calumet & Hecla Grube" in the *Zeitschrift des Vereines Deutscher Ingenieure*, June 10 and 17, 1893.

The 5,000-h.p. engine *Superior* is used to operate four drums 20 ft. in diameter and over 9 ft. wide, geared to a common line shaft driven by the engine. The engine runs continuously like an ordinary mill engine, since it is also used to drive air compressors from the same line shaft. The drums are clutched to the driven gears on the drum shaft by means of large band friction clutches, which are thrown in with the line shaft running at its full speed of 52 to 60 revolutions per minute. The speed at the periphery of the drums is about 1,200 ft. when the clutches have seized. Necessarily these clutches must slip during the acceleration period.

The engines *Gratiot, Houghton* and *Seneca* at the Calumet & Hecla mines each drive a single cone drum, the large and small diameters of which are 26 ft. and 14 ft. 3 ins., the width being 12 ft. The drums are coupled by means of hydraulic clutches to a large wheel keyed on the shaft.

For operating the two shafts Nos. 7 and 8 South Hecla, two winding engines are installed at the engine house *Hancock*. These operate each a single cylindrical drum 25 ft. diameter and about 8 ft. wide through spur gearing, the drums being coupled to the driven gear by friction clutches. The speed of winding is about 2,000 ft. per minute.

In connection with handling men it will be remembered that the writer in his original paper stated that it would probably be necessary in all deep winding propositions to use independent winders for men and rock. This would necessitate the handling of men during long periods, as in Mr. Jennings' scheme, unless extraordinarily large winding capacity for the main hoists were provided. In discussing this matter with Mr. Webb, it appeared that the varying shift time necessitated by this plan would cause trouble in supervision, as well as be costly and detrimental to the ventilation of the mine on account of the irregularity of the blasting hours.

Mr. Jennings, and also Mr. Hay, urge against the double stage for the permanent plant the necessity for transhipping ore, men, water and materials. Of these four items the first three may be dismissed at once. The ore is easily handled by self-dumping skips, four attendants being required. The men would simply walk from one cage to the other with only slight loss of time. Water can be handled easiest of all by using either a self-dumping skip or a bailing tank in the lower stage to fill the sump of the upper stage, from which it can be taken by an ordinary bailing tank. In speaking of bailing, Mr. Webb in his contribution has indicated that with a given load and size of engine nearly double the amount of water can be handled with the double stage than with the single lift. With reference to handling materials, etc., the tools will no doubt be sharpened un-

* Abstracted from the Johannesburg *Star*, of February 21, 1903.

† Abstracts of this discussion appeared in the ENGINEERING AND MINING JOURNAL of November 29, December 6 and 13, 1902, February 14, 1903. Also an article by Professor Peele in the JOURNAL of April 4, 1903.

derground in mines of such great depth and output. Additional tools and materials could be stored at the station, being lowered there when convenient by the man-and-tool-hoist, and taken away as needed. The progress of sinking would be expedited rather than retarded, as feared by Mr. Hay, since the trip from the station can be made in much shorter time than from the surface in a single lift.

It would not seem, however, that the permanent two-stage system has any advantages, for the output considered, over the single-lift-winding plant on grounds of economy, but as a sinking expedient it will probably enable the shaft to get down quicker. It was stated previously that the stage winding system may be a necessity in case it is not possible or proves too dangerous to use a tail-rope for depths of 5,500 ft., and since the writer has shown that the first cost is at least no greater, and perhaps considerably less, than that of a properly designed Whiting plant with sinking stages, and since the greater operating expense is open to question, and in view of the greater security, any possible slight inconvenience of trans-shipment of load ought not to be an obstacle to its adoption.

To operate the lower vertical stage from an underground winder, as proposed by Mr. Sederholm, would require a much more expensive installation than operating the lower stage from the surface, while the operating expense would be also higher, especially if compressed air is used, as proposed by Messrs. Sederholm and Jennings. The reheating would be objectionable. The fluctuation in the demand for power at the individual hoists makes reheating much less of an advantage than where there is a uniform demand, as, for instance, with a pumping plant.

Mr. Jennings states in his first contribution: "In connection with compressed air, it can also be said that it would be supplied by the installation required for running rock drills, and that the tendency in using it will be to lower the temperature in the vicinity of the engine driven by it, whereas the use of electrical power would be to raise the temperature of the mine in the vicinity of the motor."

But the air is reheated and may then have at times a higher temperature at exhaust than the surrounding air. The radiation from reheaters will also contribute to raising the temperature. Electric motors need not produce great elevation of temperature if the resistance control affected a number of motors in succession, or if some system like the Ward Leonard could be used. Electricity promises much greater economy of operation, but the practical working of large electric winders has not yet been demonstrated.

ELECTRIC POWER FROM COAL MINES IN INDIA.—A project is being worked up to establish a large electric plant at the coal mines in the Native State of Bikanir, in India. The power is to be transmitted to pumps raising water for irrigation from artesian wells.

STORING COAL UNDER WATER.—The London *Iron and Coal Trades Review* says that a remarkable form of coal store is about to be put into use by the British Admiralty for the purpose of keeping fuel from being injuriously affected by wind or water, whether in volume or calorific power. It takes the form of a tank or floating depot, with a capacity of 12,000 tons. It has a water-proof steel framework, and into this is sunk a central shaft, letting down into an open chamber co-extensive with the base. Here there are pumps fitted up to counteract any leakage, and men descending the shaft liberate the coal outside it as it settles downwards. The coal having been brought alongside by colliers, is hoisted by four transporters, or traveling cranes, and lowered through four hatchways into the body of the tank. There (theoretically) it settles downwards, and is released through half a dozen scoops, so as to be hauled up again in buckets and paid out to calling vessels as required.

SMELTING OF RAW SULPHIDE ORES AT DUCKTOWN.

By W. H. FREELAND

The following facts, figures and observations are intended to contribute something to the practical side of a subject, the literature of which is, unfortunately, still largely that of theory and desultory experiment.

The work described here was done at the works of the Ducktown Sulphur, Copper and Iron Company, Limited, at Isabella, Tennessee, under the writer's personal supervision. It covered a period of several months, the first of which was productive of little else than 6 per cent matte, "breakouts," and "chills"—a repetition of the writer's experience in earlier attempts here and elsewhere. But in the present instance, supported and encouraged by a board of progressive directors, and particularly by Mr. J. G. Gordon, managing director, the work was persisted in, and rewarded by the measure of success now recorded; and it may not be amiss to add here, that it has been suspended, only to clean up the stocks of roasted ore on hand before adopting it as permanent practice. The practice consists of two operations, carried out alternately in the same furnace:

First.—The smelting of raw ore to a low-grade matte, in the neighborhood of 20 per cent.

Second.—The reconcentration of the low-grade, to a 50 per cent matte.

Furnace, etc.—A Herreshoff furnace was used, a general description of which may be found in Peters' "Modern Copper Smelting." It has a total depth of 8½ ft., with a cross sectional area, at tuyeres, of 21.7 sq. ft. The regular Herreshoff forehearth, proving troublesome, was replaced by a water-cooled, blast-trapping spout, and an ordinary brick-lined settler of 5 ft. by 4 ft. by 18 ins. internal dimensions. A No. 6 Connersville blower, driven by a direct-connected engine, supplies the blast.

Duration of Campaigns.—As each locality presents its own conditions, it is useless to recount the preliminary difficulties. Suffice it to say, that these were overcome, as the lessons taught by repeated failures were learned and understood. This stage reached several campaigns of from two to six weeks were made without stoppage of blast, their duration being limited only by the necessity of shutting down to wash out silt from furnace jacket, spout, etc.

Test Run.—One of these campaigns was a test run, differing from the others, however, only in the care bestowed upon weighing and sampling.

Hourly samples were taken of each constituent of furnace charge, also of slags and mattes. These were combined into daily samples, and reduced to laboratory pulps, which in their turn were combined, in proportions corresponding to the daily tonnages. The final samples, thus representing reliable averages of the entire run, were carefully analyzed, in duplicate, by Mr. Thorn Smith, a chemist whose abilities are already known to readers of the ENGINEERING AND MINING JOURNAL. The same care was observed in the weighing of materials, including flue dust; and due allowances were made for material in furnace at start and finish of both operations.

The first operation occupied 16½ days, smelting in that period 1,120 tons ore; 89 tons quartz, 162 tons slag; 1,371 tons total burden; with 38 tons coke, the coke being equivalent to 3.4 per cent of the ore, or 2.77 per cent of total burden.

Ore, etc.—The Ducktown ore, as is well known, is a pyrrhotite, carrying less than 3 per cent copper, and no precious values. Full analyses of the ore, fluxes, coke and products used or produced in first operation are as follows:

Matte.—The matte produced is represented by 396 hourly samples. Ignoring fractions, or calling anything over 0.5 a unit, and dropping all lesser fractions, the variations in assays are shown as follows:

6	samples	assayed	11%
4	"	"	14 "
16	"	"	15 "
38	"	"	16 "
30	"	"	17 "
36	"	"	18 "
28	"	"	19 "
34	"	"	20 "
39	"	"	21 "
28	"	"	22 "
31	"	"	23 "
24	"	"	24 "
20	"	"	25 "
20	"	"	26 "
9	"	"	27 "
10	"	"	28 "
14	"	"	29 "
7	"	"	30 "
1	"	"	31 "
1	"	"	32 "
396	"	averaged	21.18%

The above numerical average is, of course, only approximate (the true average being 20 per cent). Calling all values with less than 20 occurrences accidental, the matte may be said to have ranged from 16 to 26 per cent. The lower assays are

Analyses Pertaining to First Operation

Constituents.	Materials Smelted. Ore.	Quartz	Slag (used on charge).	Coke.	Matte	Products. Flue dust.	Slag.
%							
Cu	2.744	....	.73	....	20.00	2.20	.37
Fe	36.519	1.45	39.20	2.30	47.15	30.80	38.84
S	24.848	.32	1.75	1.58	24.00	16.51	1.74
SiO_2	18.548	96.79	30.90	8.41	.44	23.92	32.60
CaO	7.294	.23	8.51	T	.10	4.45	8.24
MgO	2.672	T	2.71	T	T	1.38	3.44
ZnO	2.556	....	2.88	none	2.05	2.98	1.54
Al_2O_3	.911	.32	1.90	3.56	.82	1.94	1.50
Mn	.77	T	.85	none	.53	.56	.80
O, etc.	....	†.38	†11.37	†1.00	*4.91	*15.26	†10.88
C	....	....	....	83.86	....	....	....
CO_2, etc.	*3.138	....	....	....	....	....	....
Loss on ignition	....	.39	....	....	....	....	....
	100.	99.88	100.80	100.71	100.	100.	99.95

* By difference.
† By calculation.

Synthesis of Charge and its Products—First Operation.

Charge.	Lbs.	Cu	Fe	S	SiO_2	CaO	C	MgO	Zn	Al_2O_3	Mn	Dif.*
Ore	1000	27.44	365.19	248.48	185.48	72.94	....	26.72	25.56	9.11	7.70	31.38
Quartz	80	....	1.16	.26	77.43	.18	....	....	....	.26	....	.71
Slag	145	1.06	56.84	2.54	44.81	12.34	....	3.93	4.18	2.76	1.23	15.31
Coke	34	....	.78	.54	2.86	....	28.51	....	....	1.21	....	.10
Totals	1259	28.50	423.97	251.82	310.58	85.46	28.51	30.65	29.74	13.34	8.93	47.50
Deductions (as below)	428.95	25.10	65.75	235.88	6.69	1.26	28.51	.35	15.63	1.50	.78	47.50
Balance (+"O" to Fe, Zn and Mn)=Slag	938.24	3.40	358.22	15.94	303.89	84.20	....	30.30	14.11	11.84	8.15	"O" 108.19

DEDUCTIONS.

Products.												
Matte (20% Cu)	122.65	24.53	57.83	29.44	.54	.12	....	....	2.51	1.00	.64	6.04
Flue-dust recovered	25.71	.57	7.92	4.24	6.15	1.14	....	.35	.77	.50	.14	3.93
Volatilized	280.59	....	....	202.20	....	....	28.51	....	12.35	....	....	37.53
Totals (deducted above)	428.95	25.10	65.75	235.88	6.69	1.26	28.51	.35	15.63	1.50	.78	47.50

* This column covers imperfections in analyses, and undetermined CO_2 and O.

eliminated, as they practically all occurred at blowing in; and the higher ones because steps were taken to reduce them as quickly as detected.

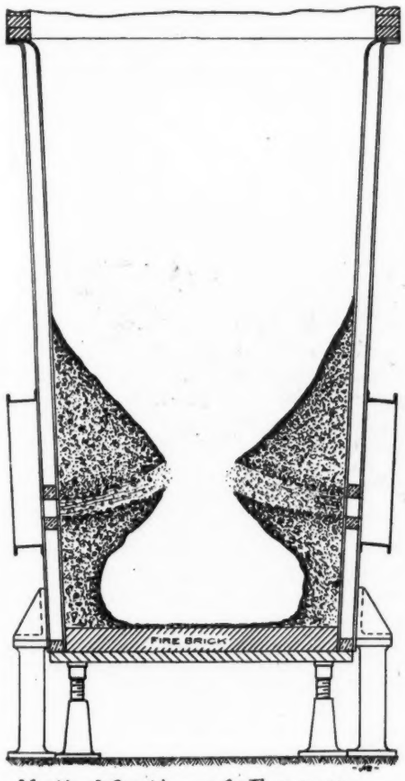
From the foregoing tonnages, the average charge is readily calculated. Based on this and the tabulated analyses, a synthesis of the charge and its products is constructed, which, if somewhat empirical, is nevertheless both interesting and useful.

Reducing the constituents of the 938.24 lb. of "the calculated" slag to percentage terms, it is seen to compare very closely with the actual slag analysis, viz.:

Comparison of Calculated and Actual Slags—First Operation.

	By Calculation. Lbs.	By Calculation. %	By Anal's. %
Cu	3.40	0.36	0.37
Fe	358.22	38.18	38.84
S	15.94	1.70	1.74
SiO_2	303.89	32.39	32.60
CaO	84.20	8.97	8.24
MgO	30.30	3.23	3.44
Zn	14.11	1.50	1.54
Al_2O_3	11.84	1.26	1.50
Mn	8.15	0.87	0.80
O	108.19	11.54	10.88
Totals	938.24	100.	99.95

Second Operation.—The reconcentration of the 20 per cent matte occupied a few hours less than three



Vertical Section of Furnace

FIG. 1.

days, and smelted in addition to the matte, 34 tons of raw ore, and discarded samplings from laboratory; this ore being added to charge to keep the tenor of final matte from rising too high for comfortable running.

Analyses, etc., of second operation are tabulated as follows:

Comparison of Calculated and Actual Slags—Second Operation.

	By Calculation. Lbs.	By Calculation. %	By Anal's. %
Cu	7.13	0.60	0.60
Fe	520.95	44.07	43.99
S	14.15	1.20	1.19
SiO_2	401.15	33.93	33.72
CaO	27.66	2.34	2.03
MgO	7.25	0.61	0.57
Zn	23.56	2.00	2.12
Al_2O_3	17.30	1.46	2.16
Mn	6.50	0.55	0.50
O	156.54	13.24	12.86
Totals	1182.19	100.	99.74

Analyses Pertaining to Second Operation.

Constituents. %	Materials Smelted. Matte.	Ore.	Laboratory Samplings.	Quartz.	Coke.	Products. Matte.	Flue dust.	Slag.
Cu	20.00	2.79	2.45	....	....	49.63	2.49	.60
Fe	47.15	43.26	31.07	1.45	2.30	25.24	24.79	43.99
S	24.00	29.18	14.84	.32	1.58	23.00	8.91	1.19
SiO_2	.44	10.01	22.66	96.79	8.41	.26	31.43	33.72
CaO	.10	6.32	5.71	.23	T	T	3.31	2.03
MgO	T	1.39	2.03	T	T	T	1.18	.57
Zn	2.05	2.56	2.05	....	none	1.53	3.81	2.12
Al_2O_3	.82	1.00	1.15	.32	3.56	T	3.93	2.16
Mn	.53	.69	.75	T	none	.39	.30	.50
O, etc.	*4.91	....		†.38	†1.00	....	*19.85	†12.86
C	....	....	*17.29	....	83.86	....		
CO_2, etc.	....	*2.80		....	....	....	....	....
Loss on ignition	....	....	....	.39	....	....	....	....
	100.	100.	100.	99.88	100.71	100.05	100.	99.74

* By difference.
† By calculation.

Synthesis of Charge and its Products—Second Operation.

Charge.	Lbs.	Cu	Fe	S	SiO_2	CaO	C	MgO	Zn	Al_2O_3	Mn	Dif.	
20% matte	1000	200.00	471.50	240.00	4.40	1.00	....	T	20.50	8.20	5.30	49.10	
Raw ore	170	4.74	73.54	49.60	17.02	10.74	....	2.36	4.35	1.70	1.17	4.78	
Laboratory samplings	34	.83	10.56	5.05	7.70	1.94	....	.69	.70	.39	.26	5.88	
Slag	160	1.17	62.72	2.80	49.44	13.62	....	4.34	4.61	3.04	1.36	16.90	
Quartz	330	....	4.78	1.06	319.41	.76	....	T	....	1.06	T	2.93	
Coke	95	....	2.19	1.50	7.99	T	79.67	T	....	3.38	....	.27	
Totals	1789	206.74	625.29	300.01	405.96	28.06	79.67	7.39	30.16	17.77	8.09	79.86	
Deductions (as below)	763.36	199.61	104.33	285.86	4.81	.40	79.67	.14	6.60	.47	1.61	79.86	
Balance (+ "O" to Fe, Zn and Mn)=Slag	1182.18	7.13	520.96	14.15	401.15	27.66	....	7.25	23.56	17.30	6.48	....	"O" 156.54
DEDUCTIONS.													
Matte (49.63%)	401.60	199.31	101.36	92.18	1.04	T	....	T	6.14	....	1.57	....	
Flue-dust recovered	12	.30	2.97	1.07	3.77	.40	....	.14	.46	.47	.04	2.38	
Volatilized	349.76	....	....	192.61	....	....	79.67	....	....	....	....	77.48	
Totals	763.36	199.61	104.33	285.86	4.81	.40	79.67	.14	6.60	.47	1.61	79.86	

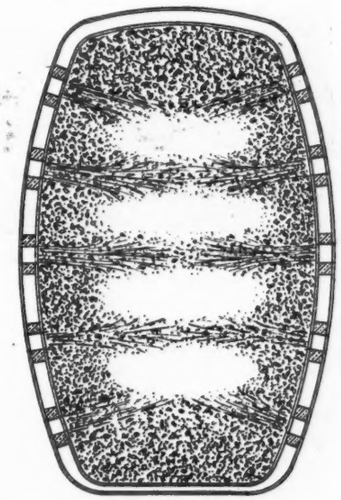
Furnace Capacity.—Including both operations, the furnace's average daily capacity is 60 tons raw ore. Its average on roasted ore may be fairly quoted at 115 tons, hence a loss of efficiency of nearly 48 per cent. But in considering this feature, it must be stated that granulated slag was used throughout the test run, and that a daily average, equivalent to 80 tons raw ore, has been repeatedly attained when lump slag was available, thus reducing the loss of efficiency to 30 per cent. It is hoped that with time and experience this loss will be still further reduced. It is highly probable that hot blast would increase the smelting capacity, but with a furnace of the Herreshoff dimensions, the additional tax for fuel, coal heavers and firemen was found prohibitive.

Concentration.—It will be seen that concentrations effected were 7.3 into 1 by first operation, and 2.5 into 1 by second, but these by no means represent the limits attainable. Contrary to the experience of many the reconcentration of the first matte presents no difficulties at Ducktown. There is no limit, within the range of matte, to the second operation. A 6 per cent matte may be brought up to a 50 per cent quite as successfully as any higher grade initial matte; nor is this statement based upon odd or occasional samples, but upon more than one car-load of matte so made.

Occasional samples of 70 per cent matte have been assayed from the reconcentration of a 10 per cent initial matte, but such conditions, if permitted to continue, would speedily result in a "chill," particularly with the scanty flow of a small furnace.

The degree of concentration, whether in first or second operation is, in the main, proportionate to the speed at which furnace is driven, and is controlled by the proportion of quartz on charge, or manipulation of blast, or both. But on these seemingly simple measures hinge not only the grade of the matte, but the life of the campaign, and probably the confidence of owners if disasters occur too often on first attempts.

Furnace Conditions.—The average volume and pressure of blast were 4,500 cub. ft. free air per minute, and 17 oz., respectively. Some incrustation forms around the furnace top, but not enough to be troublesome. At the region of the tuyeres, however, a porous friable accretion bridges the furnace from wall to wall. Light is rarely discernible on punching the tuyeres. It may seem unreasonable, but is nevertheless true,



Horizontal Section of Furnace.

FIG. 2.

that a bar has been driven through the furnace, entering a tuyere on one side, and withdrawn from the opposing tuyere, by the naked hand.

This condition, alarming as it would seem in ordinary smelting practice, is believed by the writer to be essential to satisfactory concentration. The condition encountered in barring the tuyeres leaving no doubt that, for a certain area surrounding each tuyere, the furnace is bridged from wall to wall, the molten matte and slag must find its passage into the crucible through channels between tuyeres. If visible, a horizontal section of furnace at tuyere level would probably present something like the appearance shown in the accompanying diagram, Fig. 2.

While the horizontal section is hypothetical, there is no doubt as to the vertical shape assumed by the accretion, which is found to be as shown in Fig. 1.

Granting the condition described, then the effect is, the column of charge resting upon boshes and bridge, undergoing a partial roasting in its descent, and a rapid, fierce oxidation as it reaches and is held in the constricted channels. The charge sinks evenly and uniformly, rarely showing a hot top. The slags run hot and fluid; in fact, the furnace gives less trouble throughout than those alongside smelting roasted ore, a fact testified to by the furnace hands importuning the foreman to "give them a chance on No. 1."

Coke.—Calculating the percentage of coke on copper bearing burden only, the regular charge of 1,000 lbs. ore carries 30 lbs. coke. Often days will pass without a variation in charge sheet. Occasionally from necessity, but more frequently from the foreman's timidity, the coke is doubled for an hour, or perhaps two, on a shift. It is due to these causes that the average coke percentage on test run is raised from the nominal 3 to 3.4 per cent of first operation.

On the second operation, the coke averaged 8 per cent on matte, etc. Calculating the coke of both operations back to the original ore, the total coke consumption is 4.4 per cent thereof.

Slag Losses.—Referring to the tables, slag losses are seen to be 0.37 per cent on first, and 0.6 per cent on second operation. Calculating both back to a basis of the slag of the first operation, the equivalent is 0.45 per cent, a loss that should claim the attention of all familiar with the high concentration of a low-grade ore, particularly where settler area is limited by a small matte flow.

Flue Dust.—The flue dust recovered from both operations (and almost wholly from the first) was equivalent to 53 lbs. per ton of original ore.

Economics.—While it is not within the scope of the present article to go into comparative costs, and copper recoveries, it may be added that, despite the greatly reduced tonnage capacity per furnace, the economical result of raw ore smelting is gratifying beyond all anticipation.

A NEW FRENCH BLAST FURNACE.—A new blast furnace is under construction by Messrs. Schneider & Cie., of the Creusot Works, at the port of Cette, where ores from Spain can be delivered at the wharf, close to the furnace. The works are provided with machinery, of the latest type, for handling ore and fuel. The furnace is expected to make 200 tons of pig iron a day. It is 23 meters high, the diameter varying from 6 to 4 m. The blast will be heated by four Cowper stoves, each 30 m. high and 6.4 m. diameter. The blast will be furnished by two engines of the Delamarre-Debouteville type, each of 600 h.p. driven by the waste gases from the blast furnace. There will be a central electric plant, from which power will be distributed to the machinery. There will be also a coke-making plant having 36 by-product saving ovens, and a briquetting plant for coal dust and fine ores.

ORE DEPOSITS OF TONAPAH, NEVADA.*

By J. E. Spurr.

Tonapah is situated in central Nevada, in a range of low, scattered volcanic mountains. This region has been known for a long time and has not been more inaccessible to prospectors than other similarly situated districts in the desert region. A few years ago ore was discovered in the Tonapah range of hills, a few miles south of the present camp. This locality was called the Southern Klondike and attracted a large number of prospectors. Among others, Mr. James Butler, a resident of Belmont, on his way from that place to the Southern Klondike camp, passed over the site of the present Tonapah district. Perceiving a great deal of white quartz scattered upon the ground, he picked up some pieces and took them to an assayer in the Southern Klondike; but as they did not look particularly promising they were thrown aside. On his return trip, however, Mr. Butler picked up some more samples and carried them to Belmont, where he turned them over to Mr. Oddie, a young lawer and miner, offering him a share of the claims if he would pay for the assay. Mr. Oddie sent the samples to an assayer and promised him half of his share if he would assay them. When the assays came back, as they did after some delay, they were found to be astonishingly rich, and Mr. Butler and his wife started out from Belmont and located their claims in due form.

The development of the new camp has been astonishingly quick. The property was offered to and refused by Western capitalists for a very small sum when the exploration pits were only down a few feet, the reason for refusal being that the rich ores were probably only superficial. Later on, when the developments had progressed a little further, the property was acquired at a larger figure by a Philadelphia company. They adopted the principle of leasing to develop their mine. The lessees set to work vigorously and in a short time a number of them had extracted sufficient rich ore to make fortunes of various dimensions. Being satisfied with the prospects of the mine, the company gave out no more leases, but took the management into its own hands as soon as possible. From that time to the present the chief mine, the Mizpah, has been conducted with a view to developing the resources as a basis for future operations rather than to extracting ore. A number of fine shafts have been sunk, and the country has been, and is being, thoroughly investigated, both by drifts along the principal vein and by cross-cuts.

Outside of Mr. Butler's original locations, which became the property of the Mizpah Company, and those immediately adjoining, numerous other locations were soon made, until now it is doubtful if there is a bit of unclaimed ground within several miles. Soon a number of other shafts were sunk, although with few or no surface indications. The Fraction shaft, not far from the Mizpah, passed downward through a body of cap rock of volcanic nature and found mineral veins containing large values in some places. Later on, the Mizpah Extension, on the other side of the Mizpah, encountered veins of the same system after passing through several hundred feet of cap rock. This has encouraged other companies to sink shafts through the capping, and many of them are down several hundred feet. Among these may be mentioned the Ohio Tonapah, the California Tonapah, the Montana Tonapah, the New York Tonapah, the Tonapah City, and the MacNamara. Work is being pushed vigorously, and before long much of the underground composition of the district will be shown up.

The topography around Tonapah is not one of great relief. A series of low and small, detached, and irregular mountains surrounds the town. The mountains are of volcanic origin, but have been worn down by erosion so that they have rugged and characteristic erosion features. The town itself lies in a shallow valley or wash, and from here a long, gentle wash-slope comes down to a nearly level desert valley both on the east and on the west.

A few miles north of Tonapah ancient limestones, probably Cambrian or Silurian, out-crop, and similar limestones are found some miles to the south, in the Southern Klondike District. In the immediate vicinity of Tonapah, however, only volcanic rocks are found. These consist of flows, breccias and derived tuff and ash accumulations. These volcanics are probably of Tertiary age, and represent a number of successive flows, with intervening showers of ash and breccia, and erosion intervals. On account of the confusion of these volcanics the relative order of eruption has not yet been certainly made out, but at the present time the sequence is considered to be somewhat as follows:

1. Earlier andesite.
2. Earlier rhyolite and breccias.
3. Later andesite.
4. Erosion interval.
5. Volcanic breccias and flows.
6. Great water-laid tuff formation.
7. Later rhyolite.
8. Latest lava flow (andesite or dacite?).

The oldest volcanic rock is the earlier andesite, which is commonly called the lode porphyry. Although originally an andesite, it is now, so far as examined, everywhere almost entirely decomposed and transformed into secondary products, consisting of fibrous muscovite, secondary quartz, pyrite, chlorite, iron carbonate, etc. In its present decomposed form, therefore, it is not an andesite, although originally one. This is a rock which has been described by early writers in this region as propylite; but Dr. G. F. Becker showed that the propylite of the Comstock region was an altered andesite, just as it is at Tonapah. The Tonapah rock and the

GENERAL VIEW OF TONAPAH, NEVADA.

* Abstract from advance sheets of a report on "The Ore Deposits of Tonapah and Neighboring Districts in Nevada." By permission of the Director of the United States Geological Survey.

Comstock rock are, as a matter of fact, apparently almost exactly similar in composition, and probably are also alike in point of age.

The important veins of the district occur only in this earlier andesite or lode porphyry, and not, so far as yet found, in the later rocks. So it seems that the mineralization must have followed the first andesitic eruption. Therefore, it is that the overlying volcanics do not show these veins, and constitute cap rocks which overlie them, and which must be pierced in order to reach the lode porphyry and its associated ores.

The ores are in the form of quartz veins of the kind which have been described by some writers as the "noble quartz" formation—that is to say, the quartz constitutes almost the whole of the ore, and the valuable metals are very finely distributed, so as to appear barely or not at all to the naked eye. There is also a very small quantity of the less valuable metallic minerals. Near the surface, in general, the proportion of silver to gold seems to be greater than farther down—that is to say, the proportion of gold to silver appears to tend to increase in depth. Silver is found in the form of chloride, sulphide (argentite), and ruby silver. Gold has been seen in a free state in the ore.

TONAPAH FROM MOUNT ODDIE.

The deposits are well-defined veins, maintaining a nearly regular strike and dip. The principal veins average a few feet in width. The chief trend of the veins is east and west, but in the developed region the different veins diverge regularly from one another, so that they lie like the spokes of a wheel. Where they come together near the center from which they radiate, they join and fork in the manner of forked veins. There is evidence to show that these veins, although having the characteristics of true fissure veins, have formed along zones of shearing or sheeting in the lode porphyry, and have replaced the porphyry in these zones to a more or less perfect extent. Therefore, in passing along the veins, in some places they are found to consist of pure quartz, in other places chiefly of highly silicified porphyry.

Probably contemporaneous with the mineralization there has been an extreme alteration of the original hornblende-andesite. This alteration, together with the subsequent weathering, has produced a great variety of appearance in the originally nearly uniform rock. The pyrite and iron carbonate have been derived from the decomposition of the dark minerals (hornblende, pyroxene and mica) of the original andesite. The decomposition of the feldspars and other minerals has furnished an abundance of secondary quartz. In some of the most decomposed and altered phases of the rock, therefore, the appearance is that of a highly siliceous, fresh rock, apparently a rhyolite. This is one of the common phases in the vicinity of the Mizpah. Other phases are soft and light colored; others comparatively firm and dark colored, with abundant pyrite.

The mass of Oddie Mountain is made up of a true rhyolite, later in point of age than the lode porphyry and containing, so far as yet known, no veins belonging to this period. It is also somewhat decomposed, but not nearly to so great an extent as the lode porphyry.

The later andesite occurs on Mizpah Hill in the same localities as the earlier andesite, and between certain phases of the two rocks it is often difficult to distinguish. Originally they both had nearly the same composition, and they have been altered in nearly the same way. The large feldspar crystals of the later andesite, however, are generally of greater size and more thickly set together than in the earlier andesite or lode porphyry. The mica or biotite crystals of the later andesite are also frequently intact and can be recognized in the hand specimen, while the micas of the older andesite have generally completely disappeared. The later andesite is also apt to be more highly colored in its present state than the earlier rock. It has often assumed various shades of purple and green, which led the writer to give it the field name of "purple porphyry." This later andesite is found in dike form, cutting the earlier eruptives, and also undoubtedly occurs in the form of flows. It was possibly accompanied by breccias.

About this time, and perhaps succeeding the later andesite, came the formation of the great series of stratified white volcanic tuffs which is exposed around Tonapah. At one point a thickness of several hundred feet is shown. The perfect stratification indicates that this formation was laid down in a lake which must have been of considerable depth. Since that time, however, erosion has been considerable, leaving the tuff and forming some of the low mountains in the vicinity.

There was apparently a later flow of rhyolite, in general composition like the earlier flow, but distinct in point of age and now consequently fresher in appearance. Some mineralization followed this rhyolite, producing veins and coatings of chalcedony, iron carbonate, iron oxide, etc., along the contact and in crevices in the adjoining rocks. These veins also carry small amounts of gold and silver, but have no connection with the earlier, more important mineralization.

Latest of all was the eruption of lava which forms most of the mountains around Tonapah. The nature of this lava has not yet been thoroughly investigated, but is perhaps andesitic or dacitic. No mineralization is known to be connected with it.

The writer made a number of brief examinations of certain ore deposits in the vicinity of Tonapah.

Silver Peak.—A very slight examination was made of the principal mine in the Silver Peak District. This mine is on quartz veins of great thickness and surface extent, which hold relatively small quantities of gold. The veins have been worked near the surface for many years past, although lately activity has not been very great. It is claimed that three-quarters of a million dollars' worth of ore has already been extracted. There are two parallel veins lying close to one another, both of unusual size. The work which has been done lately is purely in the nature of development, and consists in running a tunnel to tap the vein at a lower level than has been reached in the workings from the surface. This tunnel has reached and explored the vein for some distance, and it is claimed that careful assays show that the values are as good there as nearer the surface. Taken in connection with the vast quantity of ore, these values are sufficient to make the mine a great low-grade proposition, provided that power, water, etc., can be procured with sufficient cheapness to leave a margin of profit. There is, of course, a scarcity of water in the Silver Peak region, but hot springs occur in the valley below Silver Peak, and electrical transmission of power from the streams of the neighboring White Mountain Range or from the Sierras is one of the possibilities.

The veins lie in close connection with a mass of granite which is apparently intrusive into the ancient limestones, and it is believed that the vein has a close genetic relation to this granite. This point will be investigated more thoroughly the coming summer, and is an important one, inasmuch as it bears strongly upon the question of the persistence of the vein and its values in depth.

GOLD MOUNTAIN, SIX MILES FROM TONAPAH.

Southern Klondike.—This district is 9 or 10 miles south of Tonapah. Its geology in general and its ore-deposits are of an entirely distinct class from those at the first-mentioned camp. Topographically the country is much the same as at Tonapah, there being a number of low, irregular mountains which

do not rise greatly above the level of the desert valleys on each side. The district is surrounded by volcanic rocks, chiefly rhyolites, and these rhyolites occupy a portion of the district itself. The rest of the district is occupied chiefly by Paleozoic limestones, probably Cambrian or Silurian.

There are two divisions of the Klondike camp—Klondike proper and East Klondike. In the former, which is the older camp, there is a long dike-like intrusion, in the limestone, of a siliceous granitic rock, of which some specimens examined seem to consist chiefly of quartz and muscovite, and are evidently closely related to similar rock described some years ago from Belmont, Nev., by the writer, and shown to be the same as the beresite of the Ural Mountains in Russia. The Belmont District lies nearly due north of Tonapah and Klondike. Close to the contact of this granitic mass with the limestone, and following the contact faithfully for a mile or more, is a quartz vein which at the surface carried scattered high values in silver and gold. The values were chiefly in silver chloride. Some parts of the vein contain galena, which is segregated in bunches. At the very contact of the granite or beresite with the limestone there is in places a deposit of hard, nearly black hematite, which is seen to have been derived from the oxidation of original pyrite, which accompanied the contact in the granite and probably also in the limestone. Deeper exploration of these deposits has shown them to be almost entirely barren. In the main vein the quartz has continued in full strength downward, but the values have become insignificant. Similarly, a tunnel driven to the contact of granite and limestone, beneath the iron ore-deposits of the surface, shows nothing. These facts indicate that we have here an excellent example of the concentration of values near the surface, in the extreme upper part of the zone of oxidation, by the same surface waters that have operated to wear away the district and produce its topographic relief.

At East Klondike the same limestone is cut into and surrounded by rhyolite, which has produced almost exactly the same contact phenomena as the granite at the Southern Klondike. Indeed, the two rocks are probably closely connected in point of composition and origin. At East Klondike the contact of the rhyolite is marked by a broad belt of jasperoid, and similar belts are found farther away in the limestone along lines of original easy circulation for waters. The chief vein near this contact consists largely of white quartz, but is evidently due to the same solutions which produced the dark-blue jasperoid. The vein and the metallic contents are exactly like the vein at Klondike. In some places high values have been taken out of the vein, but exploration has not been pushed far enough to show the character of the vein in depth. Along certain fracture systems, which are later than the vein and have broken and displaced it to some extent, there seems to be a segregation of higher values, accomplished probably by more recent circulating surface waters.

Gold Mountain.—This lies nearly half way between Tonapah and Klondike, and is in the stage of development. Gold Mountain is composed of rhyolite, both in solid flows and in consolidated tuffs and breccias. Through these rhyolites run strong and persistent veins of quartz and delicately colored chalcedony veins, sometimes containing pyrite. In some parts of some of these veins, especially in the oxidized portions, rich assays have been obtained. The mineralization is probably of a later date than that which has produced the ores at Tonapah, but may be of the same age as those at Klondike, although the ore-deposits themselves are of a different character.

Hennepah.—The Hennepah District was at the time of the writer's visit very young and so little developed that not much could be seen. It lies nearly east of Tonapah, on the other side of a broad desert valley. The rocks of the district are volcanic, bearing a general resemblance to those at Tonapah. The veins also, of which two or three were observed, are of the same general character as the Tonapah veins, although so far they have not been shown to have anything like the strength of the better class of veins in the older camp.

ELECTRICITY VS. COMPRESSED AIR.*

By W. B. CLARKE.

The severe and peculiar conditions which attend the development and distribution of power for the operation of coal-mining machinery constitute a field to which the electric motor seems to be especially adapted. The underground use of steam-engines, to any great extent, is impracticable for obvious reasons. The much higher efficiency of the electrical system is a potent argument in its favor as compared with compressed air, which, under ordinary circumstances, should only be employed for the operation of rock-drills and coal "punchers." The conditions in many mines prohibit the under-cutting of coal with a chain machine; and the compressed-air puncher, with its very low efficiency, is extensively employed.

There has been no recent important improvements in the design and construction of the chain machine; although, of course, minor changes are continually being made. More time and attention are being paid now, than ever before, to the details of mining machinery, with the idea of eliminating the weaknesses which have developed, and especially of facilitating the repairs and renewals.

Electric mine locomotives are very extensively employed for the haulage of coal on the main entries and the branch headings, but in the majority of coal mines the cars are still gathered from the breasts by mules or horses. In a few low-vein mines, where very small cars are necessarily used, the miners push the cars between the working faces and the room necks, from which points they are collected by locomotives and hauled in trains to the tipple or shaft bottom. This practice is very limited, and is confined to practically level rooms. Mine haulage, with mules or horses, is very expensive and extremely unsatisfactory, especially where large cars are used, or where the rooms are driven on even moderate grades. It would be decidedly advantageous in many mines to employ larger and fewer cars or to have heavier grades in the rooms, provided a suitable substitute for the mule were available. The use of larger cars, handled expeditiously, would materially increase the output of a mine, with the same amount of development. In many veins it is necessary to increase the height along all of the haulage rooms in order to accommodate the smallest animals obtainable. The cost of brushing the roof, or taking up the bottom, is a formidable expenditure, especially since the material encountered is usually a hard slate or limestone. This would be eliminated in many cases by the adoption of electric mine locomotives. It is evident, from the above remarks, that an efficient gathering locomotive would meet a very important requirement in mine operation. For service of this nature, compressed air and electric storage battery locomotives have been used to some extent. The compressed air locomotive is not an unqualified success for the following reasons:

1. The radius of operation is restricted. The locomotive must necessarily be very compact, and consequently has small storage capacity, so that the reservoirs require frequent recharging.

2. The efficiency of the compressed air locomotive is very low, usually less than 40 per cent, while the plant efficiency, that is, the ratio between the effective work performed by the locomotive and the indicated horse-power of the steam cylinders of the air compressor, seldom exceeds 20 per cent. In comparison with these figures, the plant efficiency of an electric mine-haulage system, considering the losses in the engine, generator, line and locomotive, is ordinarily about 55 per cent.

3. Finally, the compressed air plant costs from two to three times as much as an equivalent electric mine haulage system. From the lower efficiency, it follows that the boiler plant must be much larger, while the compressed air locomotive itself costs much more than an electric locomotive. A three or four-stage air compressor is an expensive piece of apparatus, and the heavy pipe line, incident to the high pressure, is very costly indeed. In this connection, it might be well to add that the maintenance of the compressed air plant, as compared with the electric system, is exceedingly high. Compressed air locomotives are relatively complicated, and are subject to very frequent repairs, with consequent interruption in the output of the mine.

The paper then goes on to describe some electrical installations in detail. The conclusions reached are stated as follows:

In many mines the conditions are such that double-current generators would constitute an ideal permanent installation. The alternating-current induction motor, with its "squirrel-cage" armature, is pre-eminently suitable for use in coal mines, on account of the absence of the commutator and of armature insulation. The Davis Coal and Coke Company, for instance, with extensive operations in West Virginia, uses direct current for mine haulage only. For all other purposes, alternating current induction motors are employed, and generators of both types are installed in each of the power houses. By means of the double-current generator, both classes of service may be operated from one machine, while at the same time the advantages of high-voltage transmission may be secured by the use of step-up transformers. The writer ventures to predict an extensive field for the double-current generator in mining work.

The principal advantage of the alternating-current system lies in the possibility of employing high voltages, since the cost of transmission copper varies inversely as the square of the voltage. The voltage of the direct-current system is practically limited to about 750, on account of commutation. The voltage of the alternating-current system, however, is limited only by the insulation of the transmission line. In the open air, voltages as high as 50,000 are in successful every-day use, transmitting power for commercial purposes through distances as great as 150 miles. In mining work, however, involving underground transmission lines, the limit may be placed at approximately 10,000 volts.

In the installation at Windber, Pa., a cable containing three No. 6 B. & S. wires transmits 350 h.p. with a line loss of barely 5 per cent, and delivers direct current to the trolley circuit at 275 volts. On the other hand, if the direct-current system were used with a voltage as high as 300 at the power house and 250 at the center of distribution, that is, 16.6 per cent line loss, the transmission line would consist of 18 No. 0000 feeders on one side of the circuit and 6 No. 0000 feeders in addition to the bonded double track on the other side. With the alternating-current system the copper for 5 per cent loss weighs 2,200 lb.; while with direct-current system the copper for 16.6 per cent loss would weigh 138,500 lb., and for 5 per cent loss approximately 560,000 lb.

The system of power distribution outlined above is especially suitable for the operation of several neighboring coal mines from one central power plant. The United States Coal and Coke Company is at present installing an interesting plant of this nature in the Tug River field, near Welch, W. Va. The initial installation consists of 400 kw., 6,600-volt, 25-cycle, three-phase alternators, operating three 150-kw., 275-volt rotary converters, together with induction motors for driving coal crushers and conveyors. At first, three mines will be operated from this central power plant, but other openings will be added from time to time. A similar installation is now being made by the coal department of the Delaware, Lackawanna & Western Railroad in the anthracite field. The adaptation of the three-phase alternating-current system of power distribution to coal mining is especially opportune in this era of inception of large enterprises, and on account of the many consolidations of independent operations in the same district.

* Abstract of paper on "Electrical Apparatus for Coal Mining," presented at the Albany meeting of the American Institute of Mining Engineers, February, 1903.

ELECTRICITY VS. COMPRESSED AIR.

By W. L. SAUNDERS.

At a recent meeting of the American Institute of Mining Engineers a paper was read in advocacy of the application of electrical machinery to coal mining and certain statements were made which have incited a rejoinder from that well-known authority, Mr. W. L. Saunders. As the subject is one of practical interest to the profession at large, we publish herewith an abstract of Mr. Saunders' remarks, in the hope that a useful discussion may be forthcoming.

Like England and Germany, in the late unpleasantness with Venezuela, Mr. Saunders denies a condition of active belligerency. He says: There is no war between electricity and compressed air. Each one has its field of usefulness, and in that field each is supreme. In spite of commercial interests, in spite of prejudice and the enthusiasm of the inventor, the thing that is best will survive and flourish.

At least ten years ago our engineering papers contained large advertisements and pages of reading matter about the application of electricity to mines, recording the introduction of numerous rock-drilling plants, and claiming that the problem had been solved greatly to the advantage of the miner and with promise of large profits to the manufacturers of electrical apparatus. Edison and Thomson labored to apply electricity to mines, and each believed that the probabilities of success were great. This was the period of the solenoid rock drill, which was admirably suited, theoretically, to the percussive principle and in the development of which hundreds of thousands of dollars have been spent without satisfactory result. I have searched in vain for a standard mining equipment where electric rock drills are in constant commercial operation. During a recent trip made from New York to California I visited most of the important mines of the West and failed to discover a single electric equipment, so far as this class of mining work is concerned. If any one will inform me where there exists to-day an electric drilling equipment in constant service in mines in the United States, I shall be glad to receive the information.

Mr. Clarke[1] mentions the adaptability of electric apparatus to coal mines and the high efficiency of the electric system. There is no place where the pneumatic engineer has an easier time when competing for the introduction of machinery than in a coal mine. Air is exactly what is wanted in such a mine and electricity is what is not wanted. The one is safe and healthful, the other dangerous and destructive. The following extracts are taken from the Report of the Pennsylvania Department of Internal Affairs for 1899. Part V of the Report of Bureau of Mines says:

"Besides the increase in danger from explosive gases, other elements of danger have been introduced into the mines by the use of mining machines and electricity. These have been introduced during the past ten years, and it is the opinion of the writer that the use of electricity in any form in coal mines is a menace to lift, limb and property."

This report, for 1901, says:

"Electricity is one cause of fatalities in the bituminous mines (seven having lost their lives through it during 1901), that so far has not proved fatal to any person in the anthracite mines. Electricity in various forms has been the cause of many deaths in the soft coal mines, either from the men coming in contact with the electric trolley wire, or with the electric wire that carries the power to the electric cutting machines. In my opinion, separate traveling ways should be provided for the workmen when the haulage is done by electricity, unless the wires can be raised to a distance of at least 6 ft. from the rail, and even then there should be sufficient room for passing on the main haulage roads at all points as men cannot always reach the 'safety holes' in time. In every case where electric machines are used for cutting coal, the wires should be made absolutely safe, as men in the hurry of their work forget about the 'deadly wire,' touch it, and all is over, and the report follows 'killed by an electric shock.' Humanity demands protection for the workingmen from this most deadly agent recently introduced and employed in coal mines. I hope the time will come when 'compressed air,' 'liquid air,' or some other agent will supplant electricity in coal mines.

"In gaseous mines, electric cutting machines or other electric motors should never be permitted in use, as otherwise soon or or later they will be the cause of a great catastrophe."

Electricity, with all its usefulness and value to mankind, is not the best power to be taken down into a mine where gases and dust are liable to accumulate, and where human life is endangered by the electric spark. In cases of this kind the question of efficiency is of little or no importance when compared with greater and more serious questions, and in face of the facts with which engineers are familiar, I deny the statement that the coal mine is "a field to which the electric motor seems to be especially adapted."

As to the pneumatic mine locomotive, the statement is made that it "is not an unqualified success," and among the reasons given are that "its radius of operation is restricted." A mine locomotive which is absolutely restricted to the limits of a trolley wire would seem to have a more limited radius than one which is independent of any wire or connection, which carries its own power stored in tanks and which might go anywhere and on any track to the extent of its storage capacity. Such is the pneumatic locomotive, the first of which for mining purposes was built in the late eighties and early nineties, and of which probably not more than six or seven were in use in 1895, while to-day there are at least 150 of these locomotives in successful operation in mines, 125 of them having been built during the last three years. This record will, I think, compare favorably with that which can be shown by the manufacturers of electric mine locomotives. For a more detailed study of this subject I beg to refer to a very practical paper by Mr. J. H. Bowden, chief engineer of the Susquehanna Coal Company, entitled "Compressed Air Haulage Plant, at No. 6 Colliery of the Susquehanna Coal Company."[2]

In this paper Mr. Bowden shows that by the use of air-haulage as against mule-haulage the total saving in two years was almost equal to the total cost of the air-haulage plant; and he goes on to say that "at the average rate of saving for 1897 and 1898 the entire cost of the plant would be saved in 361 working days." I am indebted to Mr. E. P. Lord, general manager of the H. K. Porter Company, of Pittsburg, for the following comparison of cost of haulage in coal mines by means of compressed air and electricity:

Items.	1 Cost of compressed air.	2 Cost of electricity. Tons.	3 Cost of electricity. Ton-miles.
No. of working days per year.	160	200	141¼
Output per day, tons	2362½	989	989
Engineer, power house	$1.16	$1.20	$2.84
Motorman	4.20	4.23	9.31
Helpers (brakeman)	3.20	3.20	3.61
Electrician	—	1.67	3.68
Repairs to motors	0.74	5.95	8.42
Repairs to line	—	—	0.46
Repairs to generator	0.57		0.61
Fireman			2.50
Depreciation at 5%	4.74	5.20	8.17
Interest	4.73		4.41
Int., repairs and depre't'n boiler	1.63	—	—
Oil and waste for motor	0.25	0.22	0.35
Do. for generator	0.47		0.74
Steam (fuel and firing)	2.32	—	—
Totals	$24.01	$21.67	$45.10
Cost per ton	0.01015	0.02192	0.0456

In this table the figures for compressed air are taken from Mr. Bowden's paper above referred to. This plant is at Glen Lyon, Pa., at No. 6 Colliery, of the Susquehanna Coal Company. It was installed in 1895 and 1896, and includes two locomotives. One compressor was used at first, but a second compressor was added lately. In these figures, Mr. Lord has substituted the cost per ton hauled for that per ton-mile, which was given by Mr. Bowden. The average length of haul was less than one mile, and under these circumstances, the ton-mileage basis is hardly a fair one, as the delays at terminals form a large part of the entire time consumed.

The electric haulage plant is at Forest City, Pa., No. 2 Shaft of the Hillside Coal and Iron Company. It includes two locomotives and the figures are taken from Catalogue No. 1030 of the General Electric Company, published in 1901. It may be added that in figuring interest on cost, it was taken at 5 per cent for the compressed-air haulage plant and 3 per cent for the electric plant. It may also be noted that both the compressed air locomotives and the electric motors used, having been built some time ago, were probably inferior in many ways, when compared with those now in use. It is not likely, however, that one type has been improved more than the other.

As to efficiency, it is not denied that the efficiency of an air locomotive, like the efficiency of all locomotives, is low. Probably 20 to 30 per cent, which Mr. Clarke gives as the efficiency, is correct when applied to air locomotives, which do not reheat the air before use. It must be denied, however, that the efficiency of an electric locomotive is 55 per cent. In figuring on haulage plants for mines we have been told by reputable men that the estimates of boiler capacity for the pneumatic plant were substantially the same as those furnished by bidders of electrical apparatus.

As to the relative cost of an air and an electric plant, the statement is made that a compressed-air plant "costs from two to three times as much as an equivalent electric mine-haulage system." This statement is open to criticism. The relative cost of any two systems would vary with conditions. The facts are that in putting in bids for pneumatic installations we have found that at times the difference in cost has been from 50 per cent in favor of compressed air to 50 per cent against compressed air, according to the conditions; and we may say in a general way that the cost of an electric installation is lowest when operating on a single entry, involving the minimum amount of wiring, whereas, when a number of diverging roads occur the independent nature of the compressed-air locomotive, which allows it to operate over lines, without any previous preparation or expense, places it in the most advantageous position.

In the early part of Mr. Clarke's paper he alludes to "weaknesses" which have developed in the use of electricity in mines, and goes on to say that this matter has received attention, and improvements have been made which have facilitated "the repairs and renewals." Later on in his paper, when comparing the pneumatic with the electric locomotives, he speaks of the former as "relatively complicated" and "subject to very frequent repairs." This is rather rough on my friends in the air line, especially so as it is a fact that an air locomotive is a simple machine differing little from the well known perfected mechanism of the common locomotive, and that it is very much more simple in its construction and very much less liable to repairs than an electric locomotive. We have no better authority on this point than Mr. Clarke himself, who in an earlier paper[3] says: "The operating expenses of the electric haulage system would not be much less than those of the compressed air system."

In this paper also Mr. Clarke advocates where a number of electrical locomotives are employed, the establishment of an inspecting force, which shall work all night in cleaning and hunting for defects and making repairs; and further, that a spare armature or two should always be carried in stock, together with other repairs, and that this is necessary in order to avoid the delay and expense due to the loss of the use of the locomotive, the consequent reduction of the output, the express and telegram charges, not to mention the annoyance that can be avoided if the locomotive is regularly inspected, and if extra parts are carried in stock at the mine. His

[1] "Electrical Apparatus for Coal Mining," by W. B. Clarke. A paper read at the Albany meeting of the American Institute of Mining Engineers, February, 1903.

[2] *Transactions* American Institute of Mining Engineers, vol. xxx, p. 566.

[3] "Electricity versus Compressed Air—A Comparison of the Efficiencies and Relative Cost of Installation of the Two Systems," by W. B. Clarke, *Mines and Minerals*, July, 1901.

summary at the end of this article (the seventh clause) reads: "Last and most important, establish a rigid system of inspection and carry a liberal stock of repair parts."

We might add to this a little advice to any one who contemplates an electric installation, that he be prepared to take care of all repairs promptly, that he employ an experienced electrician, and that he have a shop sufficiently equipped to provide for such repairs as will be inevitable. It is a well known fact that in the mines of the Pittsburg Coal Company there are several shops located at central points in which they constantly employ a number of skilled mechanics for making repairs to electrical equipment used in their mines, and that in the large syndicate of mines controlled by the Pittsburg Coal Company, comprising 70 or 80 different mines, only two are equipped with air haulage plants; one of the air haulage plants having been installed 13 years, yet it is stated by experts familiar with the operation of these mines, that in the matter of cost of repairs and safe, uniform service, these air plants have given less trouble and have cost less than any of the electric plants at other mines. There are, of course, places where electricity is particularly well adapted for mine haulage and where it is to be preferred possibly to any other means, but those places do not exist everywhere, and it is unfair to state the broad principle, that electricity is better suited for mine haulage than compressed air.

It is a common thing to hear from electrical sources that compressed air gives a low efficiency. A restricted definition of the word efficiency is, the proportion of the power generated by the coal consumed under the boiler which is delivered by the machine in question. But in the broad, practical sense, namely, that of capacity to accomplish work in the best manner consistent with all conditions, the advocates of compressed air claim that, as compared with all other powers, it is supreme in mines. It is common to criticise the efficiency of a percussive rock-drill. The catalogues of electric-drill manufacturers have invariably stated comparisons showing that an electric drill consumes from 2 to 3 h.p. as compared with 8 to 10 h.p. in an air drill. But in the first place, the figures of electric power consumption are largely theoretical, while those of the air drill are based on an experience of 40 years. There is no doubt about the fact that an air drill when doing good service in a mine will consume from 8 to 10 h.p., but in doing this it does its work; it gets the hole in; it makes progress; it costs the minimum amount in repairs when compared with the number of linear feet of hole drilled. In these respects the air drill is the most efficient machine at work in a mine to-day. Think for a moment of the hard work done by this "pounder." Here is a machine light enough for two men to handle and yet containing within itself the capacity to make a hole in a piece of hard granite or trap rock at the rate of from 2 to 5 ins. a minute. The machine consists of little more than a piston, a valve and a cylinder, as these are the principal moving parts. The power is led through a piece of hose which in itself is certainly a simple piece of mechanism, and the compressed air is conducted alternately to one end of the cylinder and the other, thus causing the piston to strike its blows. Unless some one discovers a better way to drill rock than by the hammer blow it is likely that the air drill will stand supreme for a great many years to come. No electric drill that has thus far been devised has equaled it in simplicity; and it is certain that no electric drill has ever equaled it in drilling capacity, which is really the measure of efficiency.

The little air compressor which is mounted on the hip of a locomotive is another example of efficiency in air apparatus. This Westinghouse pump has been pointed to as a wasteful machine, and if it were used to drive the shafting of a shop it would be wasteful; but when applied to the air brake, taking its power from the boiler of the locomotive, storing it in tanks along the train and using it at the proper time to throttle the wheels and bring to a standstill within a few hundred feet a train weighing many tons, and moving at the rate of a mile in a minute, it is the most efficient device known to mankind. There is another little air device used to move switches, known as the electro-pneumatic system of switching. This is an admirable illustration of efficiency, and it also illustrates the point which I referred to in the beginning, namely, that there is no war between electricity and compressed air, and that each has its field of usefulness. This electro-pneumatic system, which controls the great Pennsylvania Railroad in its line between New York and Philadelphia, and which may be found in all large railway terminals, represents a community of interests between compressed air and electricity. Wires and air pipes run side by side, the one to act as the trigger and the other as the power to move the switch and direct the train safely, expeditiously and economically. The air part of this system, so far as the little cylinder in which is a piston moved by air is concerned, would not be an efficient engine if applied to common purposes for which power is used, but when doing its work on the switch of the railroad it is one of the most efficient known. Were this not so, some other means would be employed; and we have in this instance electricity by its side ready to serve the purpose, were it able to do so with equal efficiency.

THE STEWART RIVER DREDGE.*

By A. W. Robinson.

This dredge was built in 1902 from the writer's designs for Mr. William Ogilvie, ex-Governor of the Yukon, for the development of claims on the Stewart River, in the Yukon. The hull was built and machinery erected by Mr. W. M. Ogilvie, and the machinery was supplied complete by the writer under contract. This dredge is a special design for exploration purposes, being very light and strong, and capable of working to a depth of 25 ft. It has, nevertheless, sufficient capacity to enable it to do effective work, and to handle free material at the rate of 75 cub. yds. per hour. In this way, if there is any reasonable amount of gold in the ground to be prospected it can be made to pay, although, of course, its earning powers will not be so great as a dredge of larger capacity.

The writer believes that the class of machinery heretofore built for work of this kind has been entirely too heavy and cumbersome to send to such remote regions where the cost of freight is so high and the loss from breakdowns is great. In the Stewart River Dredge all important parts subject to strain are made of the best quality of steel forgings or castings, and as little cast iron is used as possible; in fact, almost the only cast iron parts used in the outfit are the engine cylinders and the grate bars. For facility in shipment the parts are sub-divided into convenient size and weights.

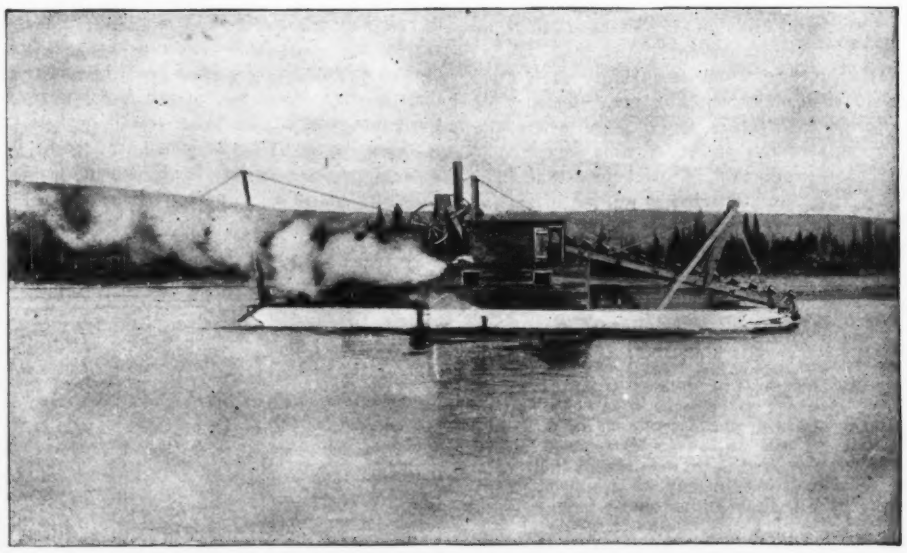
In carrying out the idea above outlined many radical departures from the usual construction were made, and a form of construction of the principal machinery was adopted, after much consideration and study, which gives the greatest simplicity and the smallest number of parts that can possibly be used to accomplish the desired result. The following is a brief description of the dredge:

The hull is of wood, 85 ft. long, 25 ft. wide and 4 ft. 6 ins. deep, and is built of a form specially adapted to work in a rapid running river if required. The main framing is also of wood, and consists of three main timbers on each side. These are connected in such a way as to hold the entire head machinery. The head-frame timbers are connected by bracket castings of steel, which also carry the ladder shaft, so that no additional attachment is necessary for this purpose.

SCREEN AND CASING FOR DREDGE.

The dredge is fitted with a chain of buckets having a nominal capacity of 2¼ cub. ft. each. These buckets are entirely of forged steel; no steel castings are used in their construction. Cast steel bucket backs are extensively used for elevator dredges, and the writer has also used them successfully for gold dredges, but where it is necessary to keep the weight down to the smallest possible limit a higher degree of strength can be secured and the liability to breakage through flaws in the steel casting obviated by making it of forged steel. The lip-plates of the buckets are of machinery steel of such hardness that they will resist abrasion and at the same time will have the requisite toughness to resist breakage. The pins are of Hadfield's patent manganese steel, and all the pin connections are bushed with renewable bushings of oil-tempered tool steel.

The material from the buckets is delivered into the hopper, and passed through a revolving screen.



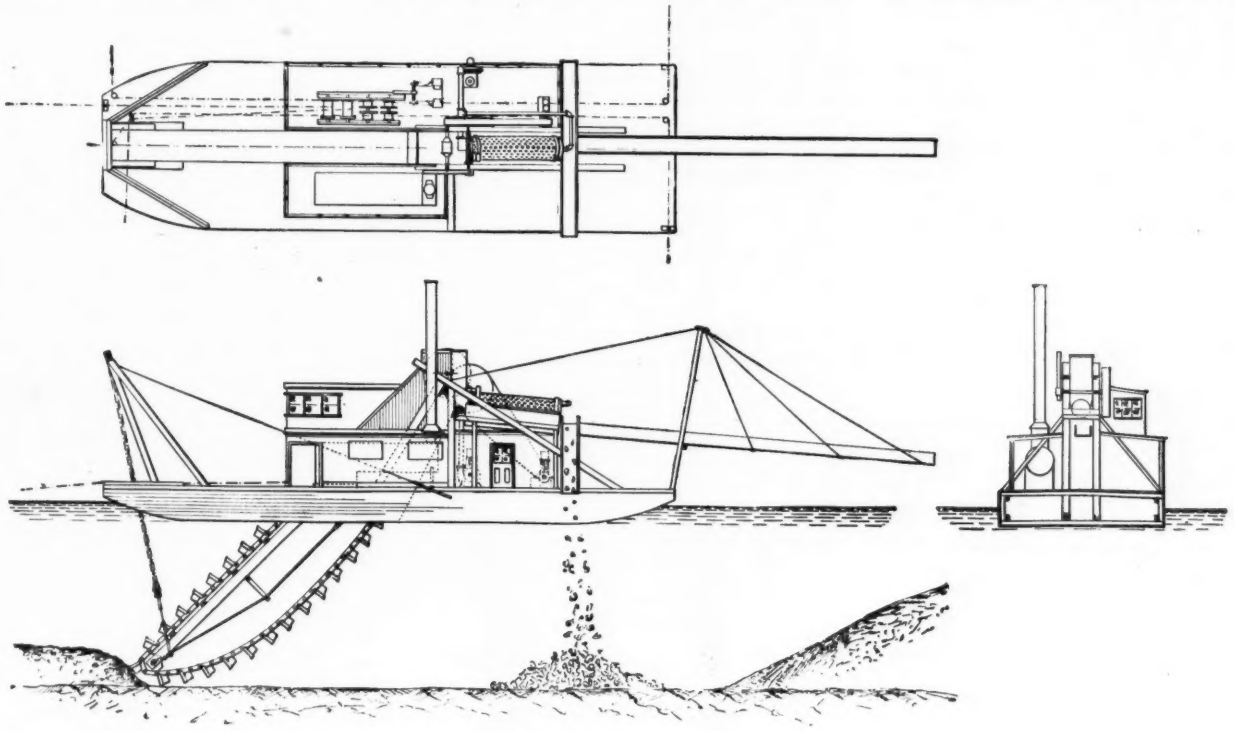
VIEW OF DREDGE IN OPERATION ON STEWART RIVER, YUKON.

* Abstract of paper read before the Canadian Mining Institute at the annual meeting in March, 1903.

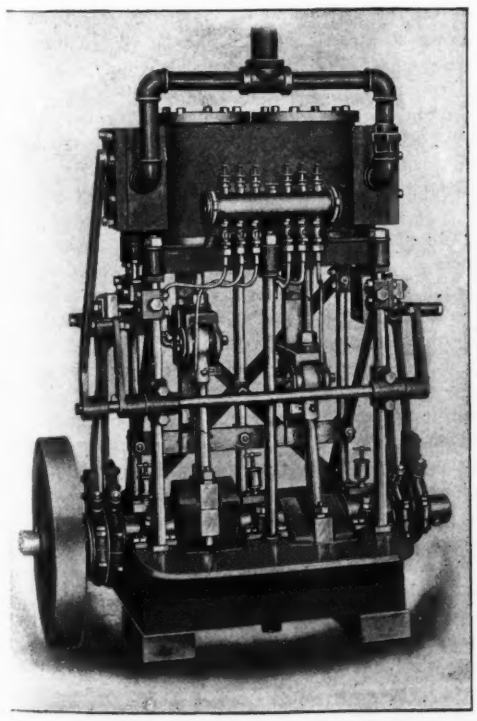
The coarse tailings are rejected and the fine material passes through the screen into the sluice-box and is discharged astern. This dredge, therefore, is of the coarse-screen and sluice-box type, as distinguished from the New Zealand type, which possesses a fine screen and in which the gold is saved on tables. The writer prefers this type of dredge wherever it can be used on the score of simplicity and also because large capacity can be reached with a comparatively small screen, and the tailings can be discharged astern and distributed without the necessity of employing a tailings elevator. The only objection that can be urged against the sluice-box type is that it is not capable of saving the very finest gold, or at least, will not save as large a percentage of it as the fine screen and table method. This is, therefore, a question of adaptability to the character of the ground and the gold to be saved, and in the particular locality where this dredge is to be used the gold is sufficiently coarse to be saved, in the sluice-box. The action of the gold-saving part of the dredge is, therefore, precisely the same as in hydraulic mining, and as the tailings are discharged astern with a large quantity of water, they can be so distributed as not to interfere with the work of the dredge. In special cases where the ground to be worked stands at a considerable elevation above the water, it may be necessary to employ a tailings elevator, but the writer has used dredges of this type which excavated their way through dry ground standing 10 to 12 ft. above water, and disposed of all the material without any tailings elevator. The movements of the dredge are controlled by wire ropes attached to anchorages, or on shore, and operated by an independent steam winch. This winch is placed on the main deck and consists of six drums driven by a pair of independent engines. In the design and construction of this winch the ideal of keeping the weight down to the smallest possible amount has been fully lived up to, and at the same time the strength and efficiency has not been sacrificed but rather improved. There is no cast iron in this winch except the engine cylinders. The drums are of rolled steel plate, with cast-steel heads. The friction housings attached to each drum of steel plate with turned flanges. All the gears are of cast-steel and even the bearings in which the shafts are carried are steel castings of special and light design lined with babbit metal. The frame of the winch consists of two bars of flat steel, to which all the bearings are bolted and which thus connects them all together and preserves the alignment and position of the gears. This bar-frame is adapted to be down on top of timbers on the deck. Each drum is fitted with independent clutch and brake. The clutch-operating levers are mounted on the winch and project up through the floor of the operating room above, so that they can be directly reached and worked by the operator without any shafts, bearings, links or connections being necessary. This in turn greatly simplifies the erection of the dredge. It is only necessary to set the winch on deck and bolt it down, when it is ready for work as soon as the steam pipes are connected.

It may be incidentally mentioned that the time occupied in the construction and erection of this dredge was very brief, considering the difficulties involved, and it is because of the smplicity of the design in little features such as these that the time of erection and completion was much less than ordinarily required.

The engines for driving the winch are of the verti-



STEWART RIVER GOLD DREDGE.



MAIN ENGINES FOR DREDGE.

DREDGE BUCKETS, .01¼ CU. FT. CAPACITY.

SIX-DRUM WINCH FOR DREDGE.

cal torpedo-boat type, with a cast-steel bed-plate and forged and turned steel column frames. The engines are fitted with link motion. They are so small and light that they can readily be picked up and carried by one or two men, and yet they are strong enough to haul the entire dredge against a current of 9 or 10 miles per hour, and can perform all the movements of the winch with ease.

With high-class machinery of this kind built entirely of steel and of light weight, not only is the cost of transportation reduced, but the liability to breakage during handling and erection also. If these parts, such as the drums and flanges of the winch, had been made of cast iron as is ordinarily the case they might easily be broken through handling or falling on the ground or otherwise injured during the vicissitudes of their long journey. With these light steel parts, however, no such risk is involved, and if by chance some parts should be injured or sprung out of shape through accident or a heavy blow it can be readily re-shaped and put back again.

The revolving screen is 38 ins. in diameter by about 14 ft. long. It is driven by steel gearing over the intermediate shaft of the head frame. A special method of driving this screen is employed which involves the use of very few parts and takes the power directly from the intermediate shaft. All the working parts are of steel, and the screen is carried on four steel rollers. A special feature of this screen is that the perforated plates are built up on a steel frame in such a way that they can be readily replaced or renewed without taking down the frame or interferring with the driving mechanism. The holes in the screen are of large size, being ordinarily calculated to permit about 80 per cent of the material to pass through into the sluice-box, only the larger stones being rejected. This practice is essentially different from the New Zealand type, in which the holes in the screen are comparatively small, so that only the fine material passes over the tables. In the present case, the screen with large holes allows the material to disappear quickly and thus increasing its capacity, and it also makes possible the disposition of the tailings without the use of the tailings' elevator, for the reason that only a small percentage of the material goes over the side, and that is not sufficient to obstruct the floating of the hull, while the remainder is washed astern and distributed over a wide area by the combined action of the water and the movement of the boat.

The hopper into which the material is discharged by the buckets is also of steel and fitted with renewable lining plates. The bucket ladder is of wood, with steel fittings and truss rods.

The main engines are of the double high-pressure torpedo-boat type, having cylinders 8 by 8 ins. The engines are entirely of steel, except the cylinders, which are of cast iron. The power is transmitted to the tumbler by means of a belt 14 ins. wide and provided with a tightener pulley. The reverse levers and throttle valve of these engines are controlled from the pilot house so that the whole of the operation of the dredge is under control of one man.

Steam is furnished by one semi-portable return tubular boiler. It has a cylindrical shell 54 ins. diameter by 14 ft. long, and it has a very large fire-box arranged under its entire length and adapted to burn inferior wood.

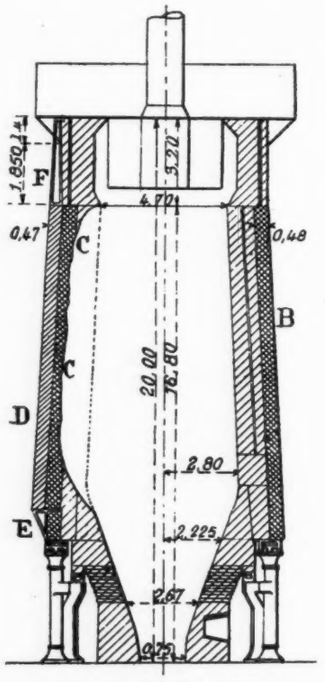
The water for sluicing purposes is supplied by one independent centrifugal pump having 10-in. suction and 8-in. discharge. In many of the New Zealand dredges the pump is driven from the main engines. The writer prefers to have it independent so that the water is under better control.

The hull is designed with ample space at the after end so that gold-saving tables can be added at any future time if desired. The disposition of weight of the machinery upon the hull is such that it floats evenly and the draft of water does not exceed 3 ft.

The work of carrying out this enterprise as well as the erection and installation of the dredge on Stewart River was in charge of Mr. W. M. Ogilvie, and great credit is due to him for its accomplishment in so short a space of time in the face of many and great difficulties. The dredge was completed and put in service on the Stewart River just before the close of last season, and could have worked a month if sufficient fuel could have been obtained. The parties, however, who contracted to furnish the fuel failed to fulfill their obligations, and as a consequence some time was lost. Sufficient was done, however, to demonstrate to Mr. Ogilvie's satisfaction that the dredge was a success, and also that it was well adapted to work the ground under the conditions as they there exist.

RE-LINING A FURNACE WHILE IN BLAST.

The accompanying illustration, for which we are indebted to *Stahl und Eisen*, represents the section of a blast furnace of the Metz Works at Esch-sur-Alzette, Lorraine, which was repaired by the addition of a new lining while still in blast. This is a very interesting method of repair, and, so far as we know, is original at these works. The right-hand



RE-LINING A BLAST-FURNACE.

half of the drawing shows the form of the furnace as originally built, while the left-hand side shows the form to which it was reduced by wear, and the method of placing the new lining. The furnace was built in 1891, and as the drawing shows, had an interior lining of refractory brick, surrounded by an exterior wall of ordinary red brick. The furnace was still in operation in February, 1899, when the masonry had reached the profile C, C, shown in the left-hand portion of the drawing, the refractory lining was completely destroyed, and in consequence, it seemed necessary to put the furnace out of blast. At that time, however, the market for iron was so strong and the price so high, that to stop the furnace would have been an injury to the works, and it was decided to attempt to make the repairs while it was still running. For that purpose a new wall, B, of refractory brick, was built, supported below by 24 brackets E, secured to the supporting columns. At the top of the furnace 12 iron brackets F, resting on the new masonry, were placed, in order to support the charging platform and the machinery connected with it. The brackets E, below, were placed in May, 1899, but the reconstruction of the wall was not begun until March, 1900, when gas was issuing from numerous cracks in the old wall. No accidents occurred, and no one was at all injured while the work of building the new wall was going on. This occupied three weeks. Although the volume of the interior of the furnace was increased by 145 cubic meters from the original size it continued to work very satisfactorily.

A LARGE ORE CRUSHING PLANT AT ESCANABA.

In the programme of improvement work recently made public by the United States Steel Corporation was a crusher plant at Escanaba, Mich., to have a capacity for crushing 510,000 tons of ore a year. This, says the *Iron Trade Review*, of Cleveland, is the first of the central crushing plants planned for the Lake Superior mines of the corporation. The second is expected to be erected at Two Harbors, Minn., but no appropriation has been made as yet. The plant at Escanaba, for which plans are now being worked out in the office of Chief Engineer Frank Drake, of the Oliver Iron Mining Company, at Duluth, will take care of such ores shipped by way of Escanaba as require to be crushed to bring them to sizes most advantageous for use in the blast furnace.

The new crusher will be located about a mile from the docks at Escanaba, immediately adjacent to the yards in which the ore trains are received and sorted. The plant will be in two parts, one for crushing ores that will be coarse after breaking and the other for ores that are to be crushed fine. For the former only one machine will be used—a No. 9 Gates gyratory machine, the ore coming from it being at once in shape for shipment. For the fine crushing a second No. 9 Gates machine and two pairs of 36-in. Edison rolls will be employed. The No. 9 machine will give the fine-crushing ores a preliminary breaking. The ore will then be passed over a screen and thence to the first of the two pairs of rolls for further crushing; thence over a second screen, and finally to the second pair of rolls—the fine crushing thus being accomplished in three stages. Experience shows that the ore passing through the screens is a considerable proportion of the amount passing a given machine.

The two No. 9 crushers referred to above will be placed side by side in a deep pit, a large pocket being built above each crusher to receive the ore from the cars. The tracks serving the crushing plant will pass over the tops of these pockets, so that ore will be dropped directly from the cars into the pockets. From the latter it will be automatically fed into the crushers by pocket-discharge rolls of the Hoover & Mason design. The No. 9 crushers will each discharge onto a belt conveyor which will ascend at an angle of 18°. In the case of the coarse crushing side this conveyor will discharge into a shipping pocket, from which the ore will be reloaded into cars for transport to the docks. In the case of the fine crushing side the conveyor will discharge into the first of the screens previously referred to, which will be placed over the fine ore shipping pocket. The material passing through the screen will drop into the pocket, and that passing over it will be carried by a second conveyor to the roll-house, where it will pass by gravity through the first rolls, thence over an intermediate screen and then through the second rolls. The fine crushed product will then be elevated by belt conveyors from the roll house to the fine-ore shipping pocket, whence it will be transported to the docks. The railway tracks by which ore will be received and shipped from the crushing plant will all be on a uniform grade, in one direction, of 1 per cent.

In operating the plant, a train of cars of either fine or lump ore will be placed on the grade above the proper receiving pocket, and a car will then be dropped down by gravity until it is over the pocket into which the ore will be discharged. The car will then be moved forward by gravity, on the same track, two car lengths, which will bring it in front of the shipping pocket for the same kind of ore. Here it will be reloaded with crushed ore and then dropped, still by gravity, to the storage tracks, where it will stand until a train has accumulated, which will then be taken to the docks. The shipping pockets for both lump and fine ore will discharge by the same automatic device that is used for feeding the No. 9 crushers, and all intermediate processes will be automatic, so that there will be no hand manipulation.

THE IRON AND STEEL INSTITUTE OF GREAT BRITAIN.

The annual meeting of the Iron and Steel Institute will be held in London on May 7 and 8 next.

The following is a list of papers submitted for this meeting:

1. "On the Alleged Diffusion of Silicon into Iron," by J. E. Stead.
2. "On the Influence of Sulphur and Manganese on Steel," by Prof. J. O. Arnold and G. B. Waterhouse, Sheffield.
3. "On the Open-hearth Process," by Lieut.-Col. L. Cubillo, Trubia, Spain.
4. "On the Application of Electric Furnaces in Metallurgy," by Albert Keller, Paris.
5. "On Hollow-pressed Axles," by C. Mercader, Pittsburg.
6. "On a New Blast-furnace Top," by Axel Sahlin, Millom.
7. "On the Manufacture of Portland Cement from Blast-furnace Slag," by C. von Schwarz, Liege, Belgium.
8. "On the Continuous-process Working on Hematite Iron," by B. Talbot, Leeds.
9. "On the Effect of Flue-dust Upon the Thermal Efficiency of Hot-blast Stoves," by B. H. Thwaite, London.
10. "On a Specimen of Sussex Cast-iron," by Prof. T. Turner, Birmingham.

Reports on research work carried on during the past year will be submitted by the holders of the Andrew Carnegie research scholarships for 1902. These are A. Campion; P. Longmuir and F. H. Wigham in Great Britain; O. Boudouard, Paris, France; E. Schott, Berlin, Germany, and W. Campbell, New York.

MICHIGAN COAL MINES.

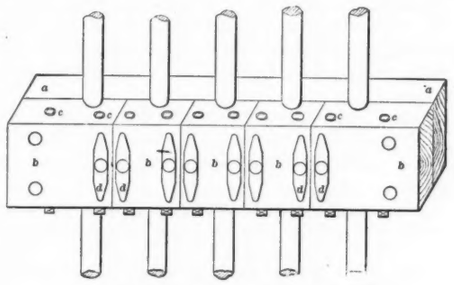
The report of the Bureau of Labor and Statistics of Michigan, which covers the year ending November 30, 1902, says that the coal production was seriously reduced during the year by the strike of the miners, which lasted a period of four and one-half months, from April to the middle of August. For the remainder of the seven and one-half months the mines showed a high average of production, and would have made a large increase over the output of 1901, had it not been for the strike. As it was, the total coal mined in Michigan in 1902 was 869,228 tons, against 1,004,040 tons in the preceding year; a decrease of 134,812 tons, or 13.2 per cent.

The tables given in the report show that an average of 21 mines were in operation during the year. The highest figure shown was 32 mines at work in November, while in April, May, June and July, only 8 small mines were operated. The number of employees reported varied from 99 in April to 2,316 in October, the average being 1,415. This shows an average production per man employed of 614 tons. The average number of days worked in all mines was 21.3 per month, and the average hours per day 7.7. The average daily wages paid were $2.75. The total cost of mining reported was $1,240,022, showing an average cost of $1.44 per ton for mining. This cost does not include tracklaying, timbering and other general work. Powder was used for blasting in 23 mines, a total of 38,566 kegs being consumed. This shows an average of 20.5 tons of coal mined per keg of powder. The report shows that 4 men were killed in the mines during the year and 20 injured, making the average 2.83 killed, and 11.13 injured per 1,000 persons at work. The report of the coal mine inspector suggests that accident reports be made more complete, and that the law be made so as to make it necessary, under penalty, for companies to report accidents of all kinds immediately.

Another change in the law recommended is that any company abandoning a mine should file with the mine inspector a correct map of such mine, showing the territory that has been excavated. Such maps should be kept on file in the department, as guides to other companies operating on the same vein. It has several times happened in such cases that the new workings have broken through into the mines which were abandoned and full of water, causing serious accidents.

A NEW GUIDE FOR STAMP MILLS.

The accompanying illustration shows a simple and practical guide for stamp stems, which is in use at the Camp Bird Mill in Colorado. This type of guide was designed by Mr. W. McDonough, superintendent of construction. Its arrangement will be readily seen from the drawing, and from this also it can be seen that it is a quick guide, very firm and rigid in construction. As is shown in the engraving, cast washers d, d, of special shape, are used, instead of the ordinary round washer, the purpose being to hold the guide more securely over its full width. The ½-in. bolts c, c, are put in crosswise, in order to prevent splitting of the guide. This



THE MAC DONOUGH STAMP GUIDES.

type of guide has been in use in the mill for some time, and has been found much more satisfactory than those previously used.

THE MINERAL PRODUCTION OF NEWFOUNDLAND.

The report of Mr. James P. Howley, head of the Geological Survey of Newfoundland, gives the mineral production of the island for the year 1902 as shown in the following table:

Mineral Production of Newfoundland, 1902.

	Quantity.	Value.
Barytes ..... tons	315	$630
Copper ore ..... tons	74,608	265,810
Iron ore ..... tons	728,721	728,721
Pyrites ..... tons	26,000	117,000
Building materials:		
Building stone ..... tons	5,000	6,000
Cobble stone ..... tons	500	500
Granite ..... tons	2,955	17,730
Limestone ..... tons	1,150	345
Paving stone ..... tons	2,250	18,000
Slate ..... squares	11,000	44,000
Brick ..... M	1,625,000	18,950
Total values	.....	$1,217,686

The table shows a steady increase in the mining industry of the island, the gain in total value last year being $15,286. The output for the year shows a value of $5.61 per capita on the population of the island, while it represents an earning power of $676.49 for the number actually engaged.

Gold is not included in the statement for the reason that the figures are not available. It is known, however, that the copper contained in the ore exported, carried about 2 oz. gold per ton of metallic copper. On this basis, last year's output should yield 4,760 oz. fine gold. To be conservative, however, it may be assumed at 4,000 oz. worth $82,680. This figure would materially increase the total value given above. In addition to this gold contained in the copper ore, it is probable that there will be an independent production during the current year. The discovery of free gold at Sop's Arm on White Bay, gives promise of excellent results.

Of the copper ore mined, 35,947 tons were shipped to Great Britain and 35,538 tons to the United States. The development of the Terra Nova Mine at Bay Verte is being prosecuted by the Newfoundland Exploration Syndicate, and that mine will soon become a shipper. It is quite probable that the York Harbor Mine at Bay of Islands, will begin to ship during the coming year.

Of the iron ore mined 107,189 tons were shipped to Great Britain; 204,720 tons to Germany; 81,920 tons to the United States; while 328,038 tons went to the Dominion Iron and Steel Company, at Cape Breton. There was a slight falling off in shipments of ore from Bell Island, but other deposits are under development. One of these is at Ming's Bight on the northeast coast; while hematite ore is reported near Canada Bay, and there is no doubt that there are other deposits which can be developed as required. Of the pyrites mined all went to the United States.

Little or nothing has been done during the year in the development of the coal resources of the island, although their development is a very important matter to the growth of the mineral industry. The borings for petroleum at Parson's Pond continue, but no further developments are reported. As to other minerals mentioned, more may be expected in the future, the chromite deposits still awaiting exploitation. The same may be said of the garnet deposits which are known to be abundant in several parts of the island. The building stone and clay industries have been prosperous during the year, and there is much encouragement for the future.

The number of persons employed in the mineral industry last year averaged approximately 1,800. There were 24 accidents, of which 6 were fatal. This shows 3.33 killed and 10 injured per 1,000 persons employed.

ZINC ORE IN NEW JERSEY.

The report of the State Geologist of New Jersey gives the production of zinc ore in 1902 at 209,386 tons, against 191,221 tons in 1901; an increase of 18,165 tons, or 9.5 per cent. This ore was all from the mines at Franklin Furnace, in Sussex County, operated by the New Jersey Zinc Company. Mr. James B. Tonking, superintendent of the mines, reports work done there during the year as follows:

At the northern end, or Parker Mine, the work has consisted in extending the several levels in a southerly direction, as noted in former reports. At the Taylor Mine (commonly called the Buckwheat) the open-work, which has consisted in removing the rock from the fold down to the tunnel level, was carried on continuously until about November 1, since which time little has been done. There is not now a large quantity of rock to be removed, the southwest face of the dike being exposed for two-thirds of its length on a cross-section from east to west. Only a small part of the ore exposed by this stripping on the west leg has been removed. The slope sunk from the trap-dike on the strike of the lens on the east leg was continued to the 700-ft. level, when a diagonal drift was driven so as to intersect the west leg. After continuing the same for about 200 ft. in a northerly direction, a winze was sunk through to the 750-ft. level, intersecting the hanging wall of the south drift from the Parker Mine. This connection between the two mines makes ventilation perfect through all of the workings.

The Trotter Mine was inactive in 1902. No ore was taken from the Stirling Hill mines at Ogdensburg.

BELGIAN BLAST FURNACES.—There were 34 furnaces in blast in Belgium in March, against 28 active, in March, 1902. The average production per furnace for March was 6,090 tons pig iron.

UTILIZING BLAST-FURNACE GASES.—The Elsassische Maschinenfabrik, of Mulhouse, Germany, has lately supplied three 200-h.p. blast-furnace gas engines on the Delamare-Debouteville system for the works of Messrs. Duro & Co., at La Felguera, Spain. One will be used as a blowing engine and the others for electric lighting purposes. The same firm have recently supplied two 600-h.p. tandem engines of similar type for the works of the Chatillon-Commentry Company at Neuves-Maisons, France.

CUMBERLAND COAL PRODUCTION.

The following figures show the production of coal in the Cumberland region in Maryland last year. They are taken from the report of the Maryland Bureau of Statistics, and were compiled by the Bureau from the records of the Consolidation Coal Company:

	1901.	1902.	Changes.
Balt. & Ohio R. R.	2,899,010	3,110,657	I. 211,647
Penna. R. R.	1,230,198	1,001,115	D. 229,083
Ches. & Ohio Canal	193,063	192,557	D. 506
Local and mine use	159,232	260,982	I. 101,750
Totals	4,481,503	4,565,311	I. 83,808

The increase last year was 1.9 per cent. The larger producers in 1902 were the Consolidation Coal Company, 1,734,168 tons; the Black-Sheridan-Wilson Company, 947,851 tons; the Maryland Coal Company, 373,399 tons; the American Coal Company, 348,920 tons; the George's Creek Coal and Iron Company, 275,399 tons.

MINERAL PRODUCTION OF QUEBEC.

We are indebted to Mr. J. Obalski, Inspector of Mines for the Province of Quebec, for the following table, showing the mineral production of the Province for the year 1902, and for the remarks on the various mineral industries of the Province, which follow the table. The figures given are in short tons, of 2,000 lb., with the exception of gold, which is in ounces:

Mineral Production of Quebec, 1902.

	Quantities.	Values.
Gold ..... oz.	300	$5,400
Iron ore, magnetite & hematite. tons	170	510
Iron ore, bog ..... tons	18,524	54,742
Chrome ore ..... tons	900	13,500
Copper ore ..... tons	31,938	121,170
Galena-concentrates ..... tons	300	15,000
Ocher, calcined ..... tons	1,555	18,175
Asbestos ..... tons	30,634	1,161,970
Asbestic ..... tons	9,764	12,738
Mica, thumb-trimmed ..... lb.	132,822	34,304
Graphite ..... tons	24	2,160
Feldspar ..... tons	52	172
Sulphate of baryta ..... tons	353	2,471
Phosphates ..... tons	881	5,401
Building materials:		
Cement ..... bbl.	36,000	61,000
Flagstones ..... sq. yds.	3,000	2,550
Slate ..... squares	4,800	19,200
Granite	.....	160,000
Other building stones	.....	530,000
Lime ..... bush.	1,000,000	140,000
Bricks ..... No.	120,000,000	625,000
Total values	.....	$2,985,463

Gold.—Some washing for gold has been done in the Beauce District on Gilbert River, the total production being 300 oz. of gold, valued at $5,400. In Dudswell some prospecting has taken place, but no production is reported.

Copper.—Mining has been carried on as usual at Capelton by the Nichols and the Eustis companies. The total output was 32,938 tons of ore; of which 13,152 tons were shipped to the United States, the balance being treated at the chemical works at Capelton. The Ascot Mine was worked during the year, but only for development; but a small quantity of good ore was taken out. Some development was also done on the King Norton Mine, while the Ballarat Mine at Melbourne was unwatered for purposes of examination.

There has been some talk of establishing a custom smelter in Sherbrooke. If this can be done, several old mines would be re-opened and some new ones started, as there would be a market for their output. It is thought that sufficient ore could be obtained to keep the smelter going. A new discovery of copper ore of good grade has been made near Matane, in the county of the same name, and a local company is now sinking a shaft with a small steam plant. The ore found is bornite and chalcopyrite, with a small quantity of native copper.

Lead.—The Lake Temiscamingue Mine shipped during the year 300 tons of concentrates, galena carrying about 17 oz. silver to the ton.

Iron and Iron Ore.—The production of iron ore was almost entirely bog iron ore; but important development work was done on the deposits of magnetic ore at Leeds. It is proposed to build a spur from the Quebec Central Railroad to this mine. The blast-furnace at Radnor was in operation nearly all the year, and the furnace in Drummondville for a shorter time. The production of pig iron was 7,971 tons, valued at $181,500. The ore consumed was 18,534 tons, nearly all bog ore, while 103,952 bushels of charcoal were used as fuel; showing an average of 2.33 tons ore and 13 bushels charcoal per ton of pig iron. Two car-loads of hematite were sent from the neighborhood of Richmond to the Drummondville furnace for experimental use. Small lots of magnetic ore were tried at Radnor. The bog ore used came from the counties of Champlain, St. Maurice, Vaudreuil, Nicolet and Drummond.

Experiments were made with magnetic sands from the northern shore of the St. Lawrence. It is claimed by Mr. Marcus Ruthenberg that this sand can be treated by his electrical process, which will fuse the iron oxide and bring the sand into a convenient form to be used in the blast-furnace. Should this prove to be the case, a high-grade ore carrying 70 per cent iron, with practically no impurities, can be obtained in very large quantities. To be profitable, however, this industry must be carried on upon a large scale, and this will require large capital. A shipment of 110 tons of raw sand was made to the United States for experimental purposes.

Ocher.—Ocher has been worked and burned at St. Malo, in the County of Champlain, by two companies. The material is used mostly in Canada for paint.

Chrome Ore.—This industry has been very quiet during the year. Only one small mine has been worked in Coleraine, shipping crude ore, while another mine was worked, supplying a concentrating mill. Two other companies have been re-organized, and will start up again mining and running concentrating mills. Experiments made by one of these companies have led to the adoption of the Wilfley table, instead of the old-fashioned jigs. The manufacture of ferro-chrome is carried on at Buckingham, but on rather a small scale. Shipments were 83 tons.

Asbestos.—There were 11 companies working at Danville, Thetford, Black Lake and Broughton, employing altogether 1,500 men. The mills built in 1901 were all in operation with the exception of the big mill at Danville, which was not quite finished. In order to prevent any over-production, work was somewhat checked during the winter months. Of the total shipment of 30,634 tons of asbestos, 1,319 tons were first quality crude, 3,131 tons second quality crude, 15,502 fiber and 10,682 tons paper stock. In addition there were 9,764 tons of asbestic shipped. In the Ottawa District nothing was done, but there is talk of starting up the Denholm Mine on a larger scale. The market for asbestos has been very good throughout the year.

Mica.—Demand continues good, but there have been changes in prices, large sizes bring less. The use of scrap for making micanite has affected the industry a little, small producers generally being put out of business. The General Electric Company has established its headquarters for mica in Ottawa, where about 300 hands are employed in finishing and preparing the mineral for market. Most of the material used last year came from Ontario, but the company has obtained control of several mines in Quebec, which will be worked next season. Shipments were mainly of the smaller sizes. Of the total of 132,822 lb., 64,463 lb. were 1 by 3; 27,861 lb., 2 by 3; 27,296 lb., 2 by 4; 11,772 lb., 3 by 5; 890 lb., 4 by 6; 540 lb., 5 by 8 ins.

Graphite.—Nothing was done in the graphite mines, except some prospecting in the vicinity of Calumet, where a small quantity of crude graphite was taken out. The mills at Buckingham were idle, although some shipments were made from old stock. There are rumors of a revival of this industry.

Phosphates.—No phosphate mine was worked during the year, but some phosphate was taken out in connection with the mica mines. Of the total reported, 535 tons were high-grade, and 326 tons low-grade.

Other Products.—The only other mineral products to be mentioned are barium sulphate and feldspar, of which small quantities were shipped.

Building Materials.—The cement business at Hochelaga during the year has been prosperous, with large shipments. A new factory is under construction at Hull, which will have a large output. With regard to lime, brick and building stone, business was generally fair, while considerable granite was taken out in different localities. The slate reported comes from New Rockland and the flagstone from Dudswell.

Peat.—The scarcity and high price of fuel last winter have stimulated experiments on peat. There is no doubt that a commercial product can be produced in the form of briquettes, and a company has been organized to develop some peat bogs. This company will be ready to put some briquettes on the market this year.

IRON ORE IN NEW JERSEY.

The report of the State Geologist of New Jersey gives the production of iron ore from the mines of that State in 1902 at 443,728 long tons, against 401,151 tons in 1901; an increase of 42,577 tons, or 10.6 per cent. The report says that this result is the more satisfactory, since the shortage of anthracite during the closing months of the year tended to retard the work of blast-furnaces, as well as to hinder the working of the mines themselves. Inasmuch as the greater part of the ore mined in the State goes at once to furnaces under the same managment as the mines, any falling off in their product is immediately felt at the mines.

Apart from the increased production for 1902 a noteworthy feature of the year's work is the favorable development at the Basic Iron Ore Company's mine, near Oxford Furnace, where a large body of soft magnetite, carrying about 5 per cent manganese, has been found. The largely increased production of the Hibernia mines, due chiefly to the extensive series of improvements instituted several years ago and still in progress, is also worthy of mention. The work of the magnetic sorter or cobber at No. 11 shaft, Hibernia, has proven so satisfactory and economical that a similar plant is being established at No. 9 shaft.

During the year the following mines were in operation, but not all of them continuously. At Oxford Furnace, Slope No. 3 (now known as the McKinley), the Washington and the Basic Iron Ore Company; at Stanhope, the Hude; at Hurdtown, the Hurd; at Weldon, the Weldon; at Port Oram, the Irondale group; at Mount Pleasant, the Richard; at Mount Hope, the Washington, Elizabeth and Teabo; at Hibernia, the Andover, De Camp, Upper Wood, Wharton and Beach Glen; at Ringwood, the Ringwood group.

MINERAL PRODUCTION OF THE DUTCH EAST INDIES.

The Secretary of the Colonial Department of the Netherlands has courteously furnished us with an advance statement of the mineral production in the Dutch East Indies during the fiscal year 1901-1902.

The mineral production of Java was limited to crude petroleum, of which 102,797,300 liters were produced.

In Sumatra the production of gold from the mines worked was 582 kgs., and of silver 3,727 kgs. The most important production is that of tin, the quantity for the year being, from Banka, 171,133 piculs; Billiton, 79,244 piculs; Singkep, 7,977 piculs; a total of 258,354 piculs. From Sumatra also there is reported 198,581 metric tons of coal. Crude petroleum is not reported, but 7,343,800 cases of refined oil were turned out.

In Borneo the production amounted to 5,530 tons of coal, 85,554 tons of crude petroleum, and 24,615 tons of refined oil.

Imports into the Dutch East Indies for the year included 184,000 tons of coal, and 87,015,400 liters of petroleum. Exports included 4,468 metric tons of tin, 1,350 tons of tin ore, and 285,191,700 liters of petroleum.

SIZES OF ANTHRACITE COAL.

The report of Mr. Heber S. Thompson, chief engineer of the Girard Estate, usually contains some interesting facts with regard to the operation of the anthracite collieries, which cannot be found elsewhere. This report is of importance, as the Girard Estate includes a number of collieries in the Schuylkill region, which are operated by different companies, so that the results obtained give a pretty fair average of the work accomplished. Last year, under the influence of the strike, the coal mined and shipped fell off nearly one-half. The total production from 11 collieries and 2 washeries owned by the Estate is shown in the following table:

	1901. Tons.	%	1902. Tons.	%	Changes. Tons.
Coal shipped ..	1,248,034	86.9	636,165	82.1	D. 611,869
Coal used at mines	188,081	13.1	138,482	17.9	D. 49,599
Total	1,436,115	100.0	774,647	100.0	D. 661,468

The decrease in the total coal mined last year was 46.1 per cent; in coal shipped, 49.0 per cent. The proportion of coal used at mines showed a considerable increase, as might be expected with the smaller output. The following table shows the output made at the collieries and washeries, respectively, in 1902:

	Collieries.	Washeries.	Total.
Coal mined or saved	590,877	183,770	774,647
Shipped to market	461,515	174,650	636,165
Consumed in operating machinery	129,362	9,120	138,482
Per cent used at works	21.9	5.0	17.9

It appears from this that 23.7 per cent of the coal came from the washeries. The high proportion was due to the fact that several of the washing plants were actively worked for some time when the mines were closed down by the strike.

It may be noted that in addition to the trouble resulting from the strike, some time was lost early in the year, in consequence of extensive repairs at several of the collieries which were made necessary by the severe floods of December, 1901. At one or two of these workings it required over a month to free the shafts from the water. The work, however, which was done during the strike put nearly all the collieries in good condition, though very little new work was done and the opening of gangways was very small compared with the usual year's operations. An interesting part of the report shows the sizing of coal, a matter on which little or no information is given in the reports of the coal companies. As already mentioned, the collieries of the estate are operated by several companies, so that it is probable a fair average is shown in the results. Last year, what are known as the small or steam sizes, came rapidly into use, on account of the scarcity of large coal, and the running of washeries, which, as a rule, make only the small sizes. The following table shows the production of the classified sizes of coal from all the operations on the Girard Estate during 1902, comparisons being made with the totals for 1901:

	1902. Collieries.	Wash'r's.	Total.	1901. Total.
Lump	0.36	....	0.26	0.06
Steamboat	3.29	....	2.39	1.70
Broken	8.37	....	6.07	9.23
Egg	12.36	....	8.96	10.51
Stove	16.73	3.11	12.99	13.50
Chestnut	23.20	8.24	19.09	20.85
Total large sizes	64.31	11.35	49.76	55.85
Pea	14.33	18.48	15.47	14.87
Buckwheat	17.47	39.40	23.49	22.26
Rice	3.87	27.11	10.25	6.52
Barley	0.02	2.91	0.82	0.50
Culm	....	0.75	0.21	....
Total steam sizes	35.69	88.65	50.24	44.15
Total	100.00	100.00	100.00	100.00

The tables given in the report extend over a period of 40 years, and show the proportion of the different sizes of coal shipped each year. Prior to 1866 the smallest size of coal used was chestnut, and everything below that grade went to the culm-bank as waste. In 1866 the shipment of pea coal began on a small scale, but increased very rapidly during the next 10 years. About 1878 a still smaller size, known as buckwheat, was separated and shipped, while about 1895 two more sizes—rice and barley—were added to the list. The growth of the use of these small sizes is shown by the fact that in 1870 shipments included 96.4 per cent of large coal —that is, chestnut and over—and 3.6 per cent of steam sizes—pea and less. In 1880 the proportions had changed to 88.2 per cent of large and 11.8 per cent small. In 1890 they were 79.4 per cent large and 20.6 per cent of small, while in 1900 the large sizes constituted only 57.4 per cent of the total and 42.6 were small coal. The proportions for 1901 and 1902 are shown in the tables. The use of this small coal started a new industry in the anthracite country, and several washeries were established for the purpose of working over the old culm-banks and saving from them the smaller sizes which had been thrown away in previous years. This industry has proved remunerative, and the quantity of coal saved by the washeries has risen to considerable proportions. Of course, 1902 was not an average year, and washery coal formed an unusually large proportion of the total, but in ordinary years it is still a large quantity.

GERMAN IRON ORE TRADE.—The imports and exports of iron ore in Germany very nearly balance. For the two months ending February 28 the imports were 534,493 tons, against 379,733 tons in 1901; an increase of 154,760 tons. Exports were 554,953 tons, against 389,218 tons last year; an increase of 165,735 tons. The imports were chiefly of Spanish ore; the exports were the minette ores of Luxemburg, to France and Belgian.

ABSTRACTS OF OFFICIAL REPORTS.

North Star Mines Company, California.

The report of this company for the year 1902 shows better results than for some time past. The total receipts for the year were $431,149, and the total expenses were $340,630, leaving a balance of $90,519. The balance on hand at the close of the year was $99,001 in cash and $14,711 in supplies at mine, making a total of $113,712. The following statement shows the operations of the mine during the year:

	Amount.	Per ton.
Incline shaft, 7,204 tons	$315,273	$43.76
Central shaft, 10,195 tons	95,875	9.40
Total ore, 17,399 tons	$411,148	23.63
Operating expenses	$134,943	$7.76
General expenses	19,285	1.11
Extraordinary expenses	10,000	0.57
Development	87,752	5.04
Improvements	24,643	1.42
Total expenses	$276,623	$15.90
Net balance	$134,525	$7.73

To this balance is to be added $10,000 from notes payable and $10,000 from stock sold, making a total of $154,525. Payments were: Interest, etc., $4,006; notes paid, $60,000; total, $64,006, leaving a balance of $90,519. The balance brought forward from previous year was $23,193; making a total of $113,712 forward to current year.

The report says: "The operations of the North Star Mine during the past year, 1902, resulted in unprecedented good fortune, not only in current production and profit, but in the still more significant developments that assure the success of the North Star Company's enterprise for many years to come. These results were mainly due to the development of a body of very good ore in the eastern portion of the old North Star mine workings, between the so-called 1,100-ft. and 1,900-ft. levels, as described in a special report, addressed to the stockholders, September 8, 1902. The year's workings show that this rich ore-body is about 100 ft. in length, along the course of the vein, extending downward from the 1,100 to the 1,900-ft. level (about 450 ft. on the dip of the vein), and thence continuing below the 1,900, where sinking has lately been begun and is now in progress, following an ore-vein of substantially the same width and quality as that above the 1,900, which has generally been mined from 3 to 5 ft. thick, yielding more than $40 per ton. The much deeper workings from the Central shaft indicate the continuance of this ore-body, 2,000 ft. below the present showing in the 1,100-1,900 bonanza. From this ore-body, between the 1,100-1,900 levels, there were mined, during the year, 7,204 tons of ore, yielding $315,273 ($43.76 per ton) at a cost of $68,306.39 ($9.48 per ton), and profit of $246,966.32 ($32.28 per ton).

"The vein-area, about 16,000 sq. ft., worked out in mining this ore, is but little more than one-third of the estimated vein-area of the ore-body above the 1,900; and if there be no shrinkage in dimensions or quality of the ore in the remainder of the body, there should be nearly $500,000 profit in the remaining vein-area above the 1,900, awaiting extraction, December 31. A shrinkage of one-half would still leave a profit equal to that of last year.

"The operations at the Central shaft were continued during the year, although hindered by much water and inadequate pumping capacity, notwithstanding which the developments were considerably extended, proving the continuity, permanence and profitable quality of the North Star vein in depth. The main raise, advancing upward on the vein, from the 4,000-ft. level, at the bottom of the new vertical shaft, toward the bottom of the old incline, is now up about half way, or more than 700 ft., showing a profitable and sometimes rich vein all the way. Drifts have been extended in both directions on the 4,000, and at the 3,900 and 3,700-ft. levels. The ore mined in these openings is unavoidably and inseparably mixed with much waste, and its yield per ton in the mills, under these conditions, is consequently low; but the mill tests and trial runs that have been made indicate that the average yield of the clean quartz mined separately, will be between $15 and $20 per ton, and not less than the general average of the whole mine, which was about $18 per ton, during a long career of many years, with a production of several millions of dollars. Meantime, in the ground directly underlying the rich ore-body in the east end of the upper mine, some of the ore has yielded in the mill about $40 per ton, with indications that the bonanza of the 1,100-1,900-ft. levels will prove to be continuous in length.

"During the year there were mined from the deep workings of the Central shaft 10,195 tons of ore, yielding $95,875 ($9.40 per ton) at a cost of $85,921 ($8.42 per ton) with little profit, amounting to $9,954 ($0.976 per ton).

"During 1902 the company has disposed of 1,000 shares of its treasury stock at $10 per share, and has now remaining 14,121 shares of originally issued capital stock which is reserved for sale at $10 per share, subject to existing options. This stock should ultimately realize $141,210 for the company's working capital fund.

"The present situation of the company's property and affairs and the outlook for the future are generally quite satisfactory and very promising for long-continued and successful operation. Profitable production from now visible resources seems well assured for some time to come, while the prospects of future developments, both in the older upper workings and the deep levels yet to be opened, not only above but far below the 4,000-ft. level, promise profitable operation for many years to come.

"If the present favorable conditions continue without interruption, the company should soon be able to resume the payment of dividends and to maintain them at moderate rate until an ample surplus fund has been accumulated, after which the current profits may be more freely distributed without further reserve."

Broken Hill Proprietary Company, New South Wales.

The latest report of this company covers the half year ending November 31, 1902. The general manager's report says that the total quantity of ore mined was 334,709 tons, a large part of which was concentrated at the mines. At the Port Pirie smelter the tonnage of ore and concentrates smelted was 134,242 tons, giving an average yield of 21.7 per cent lead and 19.7 oz. silver per ton. The refinery dealt with 27,911 tons of silver-lead bullion, producing 1,728 oz. gold, 2,536,018 oz. silver, 26,760

tons lead and 251 tons of hard, or antimonial, lead. In addition to the ore smelted, a small quantity of concentrates was sold, bring the total amount of silver up to 2,795,257 oz., and of soft lead to 32,387 tons.

The directors' report says: "At Port Pirie, the installation of the Huntington-Heberlein process in the form of a complete plant, has been the chief and most important part of the construction carried out during the half yearly period now being dealt with. The expenditure incurred in this direction has amounted to £13,283, and it is estimated that when fully completed, which it is anticipated will be shortly, the total cost will amount to about £17,000. With the starting of this plant many economies in the results obtained have been effected, which will be more fully appreciated when it is stated that practically the same amount of material is being smelted in the seven furnaces now running which formerly necessitated the entire capacity of the whole plant, thirteen furnaces. Other than troubles incidental to the starting of any large plant, no difficulties have presented themselves, and the financial results of the six months' work have benefited considerably in the direction of a better recovery of the metallic contents of the ore. The refinery has dealt with 27,911 tons of argentiferous lead bullion, producing 26,760 tons of desilverized lead, and 2,536,018 oz. of silver, which has been disposed of through the usual channels. Sales to China and the East have been satisfactory, and well-maintained, notwithstanding the fact that the Eastern exchange has been somewhat adverse to business being carried through.

"At the mines, the total output of ore raised, inclusive of that from the open-cut, amounts to 334,709 tons, approximating 2,200 tons per day, or about 1,000 tons per week more than that raised during the preceding six months. Of the above total only 34,000 tons have been obtained from the open-cut, which method of extraction has practically reached its economical limit. Of the total ore raised, 290,378 tons have been put through the concentrating plant, or about 19,000 tons more than for the previous period, at a slightly lower cost. The opening up of the underground stopes has now advanced sufficiently to permit of the night-shift being practically abolished, which alteration has been attendant with advantage both to the miners and the management. The recurrence of the old fire in Block 12 in September of the current half year was most unfortunate, but apart from the additional expenditure incurred in suppressing it as promptly as possible and a restriction of the output for a few days, no inconvenience was felt. The direct expenditure involved in this was under £2,000.

"Exploratory work is being carried on as usual at the lower depths and kept well ahead of requirements. Stewart shaft has been sunk to connect with the 650-ft. level, and the 800-ft. level McBryde shaft has been extended both north and south, in all about 200 ft., while at the 1,000-ft. level a cross-cut is being carried westward. Operations in connection with the sintering process have been largely increased during this half year, as will be observed from the tonnage dealt with, which has been over 27,000 tons, against 13,611 tons for the previous term. At the present time close upon 2,000 tons per week are being sent to the works, and the results obtained have quite realized anticipations.

"The extension of the coke works authorized by your directors is being pushed forward as rapidly as possible; when completed—which it is anticipated will be in March next—the plant will consist of 100 ovens capable of an output approximating the requirements of the smelters. The production for the half year has been 14,285 tons, all of good quality. The ironstone flux from the company's quarries at Iron Knob continues to be of very high grade, and 53,127 tons have been sent to Port Pirie, where there is now a stock of over 10,000 tons to provide against contingencies.

"The gross profit for the half year amounts to £73,459, which, after deducting £18,704 for depreciation upon the various plants, leaves a net profit of £54,755. The sum of £26,244 has been expended in construction, of which amount £13,283 has been in connection with the Huntington-Heberlein roasting plant, and £5,802 for the extension of the coke works. One dividend (133d) of 1s. per share, amounting to £48,000, has been distributed among shareholders. The continued decline in the market value of the metals has been most unfortunate, for not only has lead experienced a considerable fall, but in addition the silver market has been altogether disorganized, touching, at the end of November, its lowest record price. A slight recovery has since taken place, but it is impossible to forecast with any reasonable security what the future of the white metal may be. With regard to lead, the position appears to be looked upon as rather more reassuring, and while no large increase in price is anticipated, the European market rather looks forward to a better trade with steady values for the near future.

"Experiments carried on by the company's technical officers during the period under review have resulted in the company taking out patents for a process for the recovery of zinc. Whether this process will prove itself to be effectual and economical when exercised upon a larger and commercial scale, is a matter upon which no statement can at present be made, but trials in that direction are in hand and receiving attention."

BOOKS RECEIVED.

In sending books for notices, will publishers, for their own sake and for that of book buyers, give the retail prices. These notices do not supersede review in a subsequent issue of the ENGINEERING AND MINING JOURNAL.

Street Forestry. By Frederick Shonnard. Yonkers, N. Y.; published by the Department of Public Works. Pages, 48; illustrated.

Gold Dredging. The New Industrial. By Henry S. Bernting and Edward Van Asmus. Chicago; published by the Authors. Pages, 72; illustrated.

Geological Survey of New Jersey. Annual Report for 1902. Henry B. Kummel, State Geologist. Trenton, N. J.; State Printer. Pages, 156; illustrated.

State of Michigan. Twentieth Annual Report of the Bureau of Labor and Industrial Statistics. Scott Griswold, Commissioner. Lansing, Mich.; State Printer. Pages, 532; illustrated.

Geological Survey of Newfoundland. Reports upon the Mineral Resources of Newfoundland and upon the District of White Bay. James P. Howley, Director. St. John, N. F.; Public Printer.

Die Elektrochemie, und die Metallurgie der fur die Elektrochemie Wichtigen Metalle. By Dr. H. Danneel. Halle-a-S., Germany; Wilhelm Knapp. Pages, 84; illustrated. Price (in New York), $2.

Eleventh Annual Report of the Bureau of Statistics and Information of Maryland. Thomas A. Smith, Chief of Bureau. Baltimore, Md.; published by the Bureau. Pages, 372; with diagrams and tables.

Philosophical Society of Washington. Report of Committee on Mathematical Science for 1902. Frank H. Bigelow, Frank G. Radelfinger and Henry F. Stecker. Washington; published by the Society. Pages, 28.

Das Neue Institut fur Metallhuttenwesen und Elektrometallurgie an der Koniglichen Technischen Hochschule zu Aachen. By Dr. Wilhelm Borchers. Halle-a-S., Germany; Wilhelm Knapp. Pages, 64; illustrated. Price (in New York), $2.

Geological Survey of New Jersey; Final Report, Volume V. The Glacial Geology of New Jersey. By Rollin D. Salisbury, assisted by Henry B. Kummel, Charles E. Peet and George N. Knapp. Trenton, N. J.; State Printers. Pages, 832; with maps and illustrations.

Supplement to the Directory of the Iron and Steel Works of the United States. Containing a Classified List of the Leading Consumers of Iron and Steel. Compiled by the American Iron & Steel Association; James M. Swank, General Manager. Philadelphia; published by the Association. Pages, 196. Price, $5.

BOOKS REVIEWED.

Ohio Society of Surveyors and Civil Engineers. Proceedings for 1902. Edited by W. H. Boughton, Secretary. Granville, Ohio; Published by the Society. Pages, 124. Price, 50 cents.

This volume gives the papers and discussions of the annual meeting of the Ohio Society of Civil Engineers, together with list of members, etc. The papers relate largely to town and city engineering, and with the discussions, present many points of interest. Some of the reports of the committees are of value, especially that of the committee on roads which goes into considerable detail, as to the construction, management and improvement of roads.

The Iowa Engineering Society. Proceedings for 1902. T. R. Warriner, Secretary. Cedar Rapids, Iowa; Published by the Society. Pages, 160; illustrated.

The Iowa Engineering Society shows a creditable degree of activity in the large attendance at its annual meeting, and the number of excellent papers and committee reports presented. The papers are generally on subjects connected with municipal engineering and the construction of roads and bridges. The list includes also an elaborate paper on systems of land surveying, and a report from the committee on paving brick which contains much valuable data on the making and uses of that material.

The Bulletin of the School of Mines of Colorado. Semi-Annual Number. January, 1903. Golden, Colo. Published by the Technical and Engineering Society of the State School of Mines. Pages, 96; illustrated.

This number, which is the fourth semi-annual number of the *Bulletin*, contains papers by members of the Society and graduates of the school. Among the subjects treated are the aerial tramway, the composition and analysis of hydraulic cements, pyritic smelting, the mineral resources of Routt County, and graphic methods in hydraulics. Several of these papers are illustrated by diagrams and views, and contain excellent material.

Elements of Steam Engineering. By H. W. Spangler, Arthur M. Greene, Jr., and S. M. Marshall. New York; John Wiley & Sons. London; Chapman & Hall, Limited. Pages, 280; illustrated. Price, $3.

This book has been prepared generally for the use of students in technical schools. It is intended to present examples of the various forms of steam apparatus now in use; to explain these machines and to give reasons for their use. It contains very little theory, this branch of the subject being treated only to an extent sufficient to explain the other portions. It is naturally, to a large extent, based upon previous works, the authors claiming only the merit of casting the information into the present form. It includes chapters on the boiler, boiler details, the boiler room, the slide-valve engine, details of engine valves, motions, indicators and governors, condensing and multiple-expansion engines. Although necessarily somewhat elementary, it may be of considerable service to the general reader who is interested in the steam engine. The illustrations are numerous and are generally good, although the plates showing triple-expansion, pumping and marine engines, have been almost too much reduced to permit a careful study. They are supplemented, however, by many detail drawings, which helps to remedy this defect.

The Maryland Geological Survey. Garrett County. Pages, 340; with illustrations and atlas. *Cecil County.* Pages, 324; with illustrations and atlas. William Bullock Clark, State Geologist. Baltimore; Johns Hopkins Press.

These are the third and fourth of a series of volumes, prepared by the Maryland Geological Survey,

on the different counties of the State. Each volume is complete in itself, and is accompanied by an atlas containing large and handsomely executed topographical and geological maps of the county concerned. Garrett County is in the western part of the State, including the upper Potomac Valley, the Savage, Castleman and Youghiogheny valleys; it is the mountain region of the State. Some idea of the methods in which these monographs are prepared, is given by a list of the contents. For Garrett County, the introduction gives a brief account of its situation and general geographical features. Following this, the physiography of the county is treated by Cleveland Abbe, Jr.; the geology and mineral resources by George Curtis Martin; the soils by C. W. Dorsey; the climate by O. L. Fassig; the hydrography by A. H. Pressey and E. G. Paul, and the forests by H. M. Curran. The greater part of the volume is devoted to the geology and mineral resources. The most important of these are the coal, clays and building stone. The county includes a small part of the George's Creek basin, while, in its upper end, some mining has been done in the Potomac and Youghiogheny basins. The fire-clays of the county are especially valuable, the Mt. Savage, Bolivar and other deposits having been long known as material of high grade for the manufacture of refractory brick. The building stone includes sandstone and limestone, and there is also a variety of rocks making excellent road material. Iron ore is found in the county, and limonite was mined many years ago and worked up in charcoal forges. No mining of iron ore, however, is now carried on in the county. The forest resources are of much importance, as a considerable part of the county consists of hills and mountain land, upon which the forests constitute by far the most valuable possible crop. Little attention has heretofore been paid to this resource, however, and the paper upon the subject should possess a great deal of interest to owners of land in the county.

Cecil County, to which the second monograph relates, presents a strong contrast to Garrett County. It is in the northeastern part of the State, adjoining the Pennsylvania and Delaware State lines, and bordering on the upper portion of Chesapeake Bay. It has no mountains or hills of any importance, the highest point in the county being little over 500 ft. above the level of the sea. The greater part of the county constitutes a portion of the geological division known as the coastal plain, though its western portion is included in the Piedmont plateau. The mineral resources include building stone, clays of various descriptions, kaolin and fire-clay. There have been from time to time rumors of the discovery of gold in the county, but no payable deposit has ever been located. Chrome ore was worked for many years in the neighborhood of Conowingo and at Rising Sun, near the Pennsylvania line. The last chrome ore mine, however, was abandoned two years ago. Iron ore was discovered in the county at a very early date, near Elkton, and on the Northeast River. Iron works were erected at Principio as early as 1722, and these works are still in existence, although, of course, in a very different form. For over a century, charcoal forges were in operation at this point, turning out bar iron and blooms from local ores. At the present time, however, the local ores are not used. The papers on Cecil County include the physiography by George B. Shattuck; the geology by F. H. Bascom and George B. Shattuck; the mineral resources by E. F. Matthews; the soils by C. W. Dorsey and J. A. Bonsteel; the climate by O. L. Fassig; the hydrography by A. H. Pressey, and the forests by H. M. Curran.

Both the monographs referred to are comprehensive in their nature, and are fully illustrated They constitute records of the economic geology of the counties referred to, which should be extremely valuable to owners of property therein. They are published in very handsome style, and, as already noted above, the maps accompanying them are excellent specimens of work.

RECENT DECISIONS AFFECTING THE MINING INDUSTRY.

SPECIALLY REPORTED.

WHEN PARTY IS NOT ENTITLED TO HAVE JURY VIEW MINING PREMISES.—The laws of Colorado provide (*Mill's Annotated Code*, section 188a) that in all actions involving title to or possession of a mining claim the court on the application of either party shall send the jury to view the premises. The laws of the United States (*United States Statutes*, 1901, p. 1431) enact that in any action brought pursuant to Revised Statutes, section 2326, if title to the grant shall not be established by either party the jury shall so find and judgment be entered according to the verdict. Section 2326 provides that on the filing of an adverse claim proceedings for a patent shall be staid until the controversy is settled or the adverse claim waived, and that failure of the adverse claimant to proceed with diligence to a final judgment in an action to establish his claim is waiver of the claim. Held by the court, that where the adverse claimant waived his claim by failing to introduce any evidence to show his title, he was not entitled to a view, under said section of the laws of Colorado, on the theory that the Government was a party in interest for the purpose of seeing that a proper title was shown by the successful party.—Connolly v. Hughes (71 *Pacific Reporter*, 681); Court of Appeals of Colorado.

RIGHT TO INJUNCTION AGAINST STRIKERS INTERFERING WITH FILLING CONTRACTS.—A corporation alleged that it was engaged in the business of selling coal and coke; that it had contracts with coal companies by which it was to take all their product at the mines, to furnish transportation, and sell the same at prices to be fixed by the companies receiving a stipulated sum per ton for its services; that by the terms of such contracts the coal companies were not liable for damages for failing to furnish coal, where such failure was caused by strikes; that in reliance on such contracts it had made contracts for the sale of large quantities of coal and coke; and had provided for its transportation; that said companies were willing to furnish such coal and coke, but were prevented from doing so by the unlawful acts of certain individuals who were conducting a strike among the miners, and who by intimidation and threats prevented others from working in the mines. It was held that this complaint showed such contract rights in the corporation as entitled it to maintain the suit in its own right for their protection, independently of the other companies, and that it stated a cause of action for an injunction against the individuals to prevent their further unlawful interference with the performance of the contracts with by the coal companies; it being further shown that there was not an adequate remedy at law.—Chesapeake & Ohio Coal Agency v. Fire Creek Coal and Coke Company et al. (119 *Federal Reporter*, 942); United States Circuit Court.

JURISDICTION OF SUPREME COURT OF CANADA OVER YUKON MINING MATTERS.—The Supreme Court of Canada has jurisdiction to hear appeals from the judgments of the territorial court of Yukon Territory sitting as a court of appeal constituted by the ordinances of the Governor in Council of March 18, 1902, in respect to the hearing and decision of disputes concerning mineral lands in the Yukon Territory. The Governor in Council has no jurisdiction to take away the right of appeal to the Supreme Court of Canada provided by 62 and 63 Victoria, Chapter 11, of the Statutes of Canada.—Hartley v. Matson (32 *Supreme Court Reporter*, Canada, 644); Supreme Court of Canada.

In an action by free miners who had staked placer mining claims within the limits of a concession granted for the purpose of hydraulic mining to set aside the hydraulic mining lease on the ground that it had been illegally issued and was null and of no effect, it was held that where there was a hydraulic lease of mineral lands in existence the mere fact of the free miners "staking" on the lands included within the limits of the lease did not give them any right or interest in the lands, nor did they thereby acquire such status in respect to same as would entitle them to obtain a judicial declaration in an action for an annulment of such lease.—Hartley v. Matson (32 *Supreme Court Reporter*, Canada, 555); Supreme Court of Canada.

CORRESPONDENCE.

We invite correspondence upon matters of interest to the industries of mining and metallurgy. Communications should invariably be accompanied with the name and address of the writer. Initials only will be published when so requested.
Letters should be addressed to the MANAGING EDITOR.
We do not hold ourselves responsible for the opinions expressed by correspondents.

Graphite as a Preventive of Boiler Scale.

Sir.—Will you please publish the following: A very small quantity of graphite added to water used for boilers will prevent scaling, and if the boiler already has scale it will not only prevent further deposition, but the minute particles of graphite will penetrate the old scale and soften it, so that it will drop to the bottom and can be taken out inexpensively. This assertion is based upon fact. Having used water taken from the mine, which was only slightly discolored by graphite, the softening of the scale was accidentally discovered. The water apparently contained nothing else which might have produced the same result. We used the water probably two months before the discovery was made.

R. O. KOHL.

La Colorado, Sonora, Mexico, April 15, 1903.

The Chemical Works at Midland, Michigan.

Sir.—We note your remarks in the last number of the ENGINEERING AND MINING JOURNAL regarding the United Alkali Company, Midland, Michigan. This is a mistake; the only firm in Midland manufacturing bleaching powder is the Dow Chemical Company, and this firm has no connection whatever with the United Alkali Company being a purely American concern.

Your statement that this plant is shut down is only partially correct, as one plant has been running continuously. Our largest plant was only shut down for about ten days, this shut down being a result of the strike of the miners in the Saginaw Valley coal district.

THE DOW CHEMICAL COMPANY,
HERBERT H. DOW, General Manager.

Midland, Mich., April 25, 1903.

Gold and Diamonds in Placer Workings.

Sir.—In your issue of November 8 last, that I have been unable to read before now, I see under the head of "Questions and Answers—Placer Mining"—that no alluvial deposit is known in which gold and diamonds are extracted at the same time. It may be of interest to your readers to know that such deposits do exist. I was sent a few years ago to report about a diamond deposit in Lagoa Seca, Province de Minas Geraes (Brazil), and had a good deal of gravel washed to ascertain the value of the ground. This was done by means of the *caco*, a crude native device consisting of a sort of stall where the dirt is loaded and water thrown upon it, thus classifying the elements by order of density. In every case we found, after catching the diamonds among the heavy stuff of iron sands, garnets, rutile, monazite, etc., that gold had settled on the bottom of the stall, and this was recovered with a pan. The gold was very fine, but its value was a good share of the recovery.

It seems easy to recover gold and diamonds at the same time, whatever be the process employed to work a mine, even when the hydraulic process is resorted to, as in Bagagem, to work diamond alluvial deposits.

MAURICE CLERE.

Paris, France, April 13, 1903.

QUESTIONS AND ANSWERS.

Queries should relate to matters within our special province, such as mining, metallurgy, chemistry, geology, etc.; preference will be given to topics which seem to be of interest to others besides the inquirer. We cannot give professional advice, which should be obtained from a consulting expert, nor can we give advice about mining companies or mining stock. Brief replies to questions will be welcomed from correspondents. While names will not be published, all inquirers must send their names and addresses. Preference will, of course, always be given to questions submitted by subscribers.

Ferro-phosphorus.—Do you know of any use for this alloy? Why should a steel maker wish to use such material, after the steel has had all phosphorus carefully removed from it in manufacture.—D. M. N.

Answer.—A patent—No. 724,141—just issued to John Stevenson, Jr., covers a method of "re-phosphorizing steel." The following extracts from the specifications will serve to explain the reasons for doing this, and also, to some extent, the methods:

"In the manufacture of tin-plate and sheets from basic open-hearth steel much trouble is encountered in the process of opening or splitting the black sheets from the doubled and rolled packs, due to the sticking of the sheets one to another. This does not take place with bessemer steel, a steel containing a higher percentage of phosphorus than basic steel, as in the process of manufacturing basic steel this element is largely removed. It has been found that no element so influences or tends to nullify the sticking of the sheets as the presence of phosphorus. Hence it has necessitated in the manufacture of basic tin-plate or sheets the finding of some means of restoring or adding phosphorus to the steel to overcome this difficulty. This has been done hitherto by adding to the steel as it issues from the open-hearth furnaces a phosphoritic material, the most suitable of which until recently has proven to be a phosphatic limestone or apatite. The use of this material has not proven satisfactory for several reasons. . . .

"The foregoing difficulties have been somewhat overcome by the rephosphorization of the steel by a pig metal high in phosphorus, called ferro-phosphorus. Its use, while it overcomes some of the trouble does not remove all, and in addition it complicates the conditions somewhat. For instance, ferro-manganese is used to recarburize the steel and at the same time by the addition of the manganese induce in the steel the property of rolling without cracking. The ferro-phosphorus is of necessity added at the same time, both being added when the metal is being tapped into the ladle to avoid loss of the elements carbon, manganese and phosphorus by oxidation. The addition of the ferro-manganese itself has a tendency to chill the bath, which effect is further increased by the addition of the ferro-phosphorus, for in order that the elements carbon, manganese and phosphorus can enter the stel the amount of heat absorbed must be sufficient to thoroughly liquefy the cold ferro-phosphorus and ferro-manganese. Again, as ferro-phosphorus contains a considerable amount of carbon this is of necessity taken up by the bath, for which allowance must be made in the carbon content of the bath in addition to that introduced by the ferro-manganese. As the loss of available carbon varies according to the condition of the bath, this means the introduction of two variable factors in the final result. These difficulties in the manufacture of basic steel for tin-plate and sheets can be overcome by the use in recarburizing and rephosphorizing of a metallurgical product which may be described as a phosphoric ferro-manganese—an alloy combining in one the uses and properties of both ferro-phosphorus and ferro-manganese. In ferro-phosphor-manganese the elements desired in the steel for the manufacture of tin-plate and sheets—viz., phosphorus and carbon and manganese—are concentrated to a high percentage, and the medium by which they are bonded—the inert iron—is reduced in quantity. By its use improved results are obtained."

The alloy used under the patent just mentioned is a ferro-phosphor-manganese. It is made by smelting a manganiferous iron ore and using apatite or phosphate rock as a flux, instead of limestone. The proportions used in this alloy are preferably 50 to 60 per cent manganese, about 25 per cent iron and 15 to 25 per cent phosphorus. This alloy is also covered by patent 724,142.

ALUMINUM IN GALVANIZING.—The use of a very small proportion of aluminum—less than 0.01 per cent—in the zinc is said to give very good results in galvanizing. It makes the bath much more fluid, while it said that the sheets are brighter and keep their color better.

PATENTS RELATING TO MINING AND METALLURGY

UNITED STATES.

The following is a list of patents relating to mining and metallurgy and kindred subjects, issued by the United States Patent Office. A copy of the specifications of any of these will be mailed by the ENGINEERING AND MINING JOURNAL upon the receipt of 25 cents. In ordering specifications correspondents are requested to name the issue of the JOURNAL in which notice of the patent appeared.

Week Ending April 21, 1903.

725,648. PROCESS OF TANNING HIDES, SKINS, OR OTHER ANIMAL TISSUES.—Otto P. Amend, New York, N. Y. The process of tanning which consists in exposing the skin or hide to the action of a nitrite of a tanning metal in solution, and the ingredients of an ordinary tanning liquor in solution.

725,661. SMELTING-FURNACE.—Edgar F. Blessing, Philadelphia, Pa., assignor of two-thirds to Herbert M. Shimer, Philadelphia, Pa., and Frank Blessing, Harrisburg, Pa. A device consisting of a heating-chamber, a fire-box therein, a main muffle within said chamber contacting with said fire-box, and a continuous flue surrounding the muffle and leading from the fire-box.

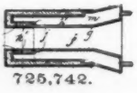
725,683. PROCESS OF OBTAINING ALUMINA.—Charles A. Doremus, New York, N. Y. A process of obtaining alumina by first reacting upon aluminous material, such as specified, with an acid containing fluorine, thereby producing aluminium fluoride, and then subjecting such fluoride to the action of superheated steam.

725,690. BRICK OR BRIQUETTE MAKING MACHINE.—Joseph W. Ferguson and George W. Ferguson, Wangaratta, Victoria, Australia. In an improved brick or briquette making machine molds and partitions forced from a press-box by a ram and pitman said pitman being pivoted to a crank, said crank loose upon the main driving-shaft and rotated therewith by a clutch rotating with the said shaft, said clutch having a circumferential groove around it, in which engages a fork the arm of which has a round thereon, said arm being pivoted to a pillar, a clutch-lever having a vertical recess beneath the same and engaging the said rounded portion on the arm.

725,693. APPARATUS FOR PREPARING COMPOSITION FOR ARTIFICIAL STONE, BRICKS, ETC.—Lewis P. Ford, Gresford, England. An apparatus for preparing composition for artificial stone bricks and the like comprising a mixer-casing in U form having a heating-jacket and provided with concave ledges located on the inside, which constitute conduits at the upper edges of the mixing-casing for carrying off superfluous moisture from within the mixing chamber.

725,696. CANTILEVER FOR DUMPS.—Joseph P. Gallagher, Chicago, Ill., assignor to Lorimer & Gallagher Company, Chicago, Ill. The combination with a track, of a truck supported thereon, a forwardly-projecting substantially horizontal cantilever supported on the truck, parallel with the track, operative mechanism seated on the rear of the cantilever forming a counterweight therefor, an inclined track-section and a dumping-car.

725,742. TUYERE.—James W. Miller and Michael Webb, Joliet, Ill. In a tuyere, the combination of recessed or



725,742.

offset inner and outer walls; and insulating material covering the offset portions of said walls and the inner extremity thereof, and said insulating material abutting the offsets in said walls.

725,745. COKE-OVEN DOOR.—Edwin A. Moore, Philadelphia, Pa. A coke-oven door, consisting of a base, a detachable section secured to said base, a non-conducting material serving as a door-lining, and an insulating material between the non-conducting material and said base, both of which materials are within and surrounded by the wall of said section.

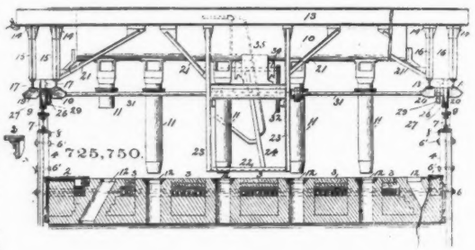
725,746. WATER-COOLED COKE-OVEN DOOR.—Edwin A. Moore, Philadelphia, Pa. A hollow, rectangular coke-oven door having communicating water-chambers therein, a vertical reinforcing partition near the transverse center thereof extending from one end nearly to the opposite end, a water-passage between the end of said partition and the inner wall of the door, a water-inlet in one chamber, a water-outlet in the other chamber, and an opening in each chamber for the removal of foreign matter.

725,747. WATER-COOLED COKE-OVEN-DOOR FRAME.—Edwin A. Moore, Philadelphia, Pa. A hollow coke-oven-door frame provided with partitions extending from the upper end of the frame down through the side and part way across the lower end toward the transverse center.

725,748. FOUNDATION OR SUBSTRUCTURE FOR COKE-OVENS.—Edwin A. Moore, Philadelphia, Pa. A foundation or substructure for coke-ovens, comprising a floor, girders and joists of metal embedded in concrete, and columns of concrete; in combination with metallic tie-rods between the girders and the columns.

725,749. MEANS FOR PROTECTING COKE-OVENS.—Edwin A. Moore, Philadelphia, Pa. A coke-oven having its sides incased in metallic sections provided with recesses in the rear sides thereof, and heat-non-conducting material in said recesses.

725,750 CONSTRUCTION OF COKE-OVENS.—Edwin A. Moore, Philadelphia, Pa. A coke-oven having rails on each



side thereof; in combination with a coal-charging car having laterally-movable wheels engaging said rails.

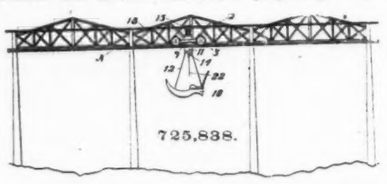
725,769. AUTOMATIC BLOWPIPE.—August Princen, Minnesota, Minn. A device comprising a tank having a horizontal diaphragm, a wick-tube extending upwardly from the lower compartment and having a regulating sleeve, a generator-tube extending outwardly from the upper compartment above said wick-tube and having a burner-tube connected with an opening in the under side thereof, and separate tightly-closed filling-openings for the upper and lower compartments.

725,786. PROCESS OF TREATING SUBSTANCES WITH NASCENT CARBON DIOXIDE.—William Smethurst, Dolgelly, England. In a process for the treatment of substances with nascent carbon dioxide, mixing a carbonaceous combustible gas with its chemical equivalent of air for perfect combustion and burning said mixture under pressure in a solution containing the calcium borate to be treated and recovering the boracic acid by decanting while the solution is warm.

725,794. CLAM-SHELL BUCKET.—Swan Swedenborg, Ashtabula, Ohio. Two jaws, pair of opposed sectors having segmental racks meshing with each other and having inner ends of jaws hinged at lower ends of segments, links each pivoted to outer end of a jaw and to the segment of the opposite sector, and a pinion meshing with one of the racks.

725,813. MOTOR-PUMP.—Donat Banki, Budapest, Austria-Hungary. The combination of a pump-cylinder having a closed end, a motor-cylinder having an open end projecting into the pump-cylinder and facing the closed end of said pump-cylinder, said motor-cylinder being of a smaller diameter than the pump-cylinder so as to be surrounded by a jacket which forms part of the pump-cylinder, and a piston arranged to move in the motor-cylinder and to project therefrom into the pump-cylinder.

725,838. AERIAL RAILROAD SYSTEM.—Louis A. Gross, San Francisco, Cal. An aerial-tramway system, comprising in combination, an overhead rigid track, a car pendent therefrom and movable thereon, a propelling-cable, turn-



outs along said track onto and from which said car may be switched, grip mechanism operable from the car by which the cable may be engaged to propel it along said track or disengaged to allow the car to pass onto said turnouts, a switch controlling the turnouts and means connected therewith whereby the grip mechanism is operated to release the cable substantially simultaneously with the throw of the switch.

725,844. DEVICE FOR EXTRACTING DRILLS, ETC.—Charles A. Horan, Stockton, Cal. A grappling device consisting of a stock, a cage applied to the lower end of the stock and comprising a thin sheet-metal band of uniform diameter provided with two pairs of diametrically-opposed arms integral with its upper edge and extending upwardly therefrom and connected at their upper ends to the stock, bearing-pieces upon the inner faces of one pair of the arms, a pair of clutch-plates having journals pivotally mounting them upon the bearings and notched in their edges to clear the arms.

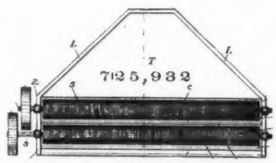
725,864. APPARATUWS FOR THE TREATMENT OF GOLD OR OTHER ORES.—William B. McPherson, Los Angeles, Cal. A precipitating apparatus for depositing gold and silver from a solution of cyanide of potassium and from other chemical solutions consisting of a precipitating-box for holding said solution, provided with valves and a series of electric conducting-plates, connected with a source of electric supply, a gage-receptacle having a float adapted to reciprocate therein, means for connecting the said precipitating-box and gage-receptacle, a yoke secured to said float, a valve-rod, devices for connecting said yoke and valve, rod and valves adapted to be operated by the rise and fall of the float within the receptacle.

725,884. SAND CUTTING, SIFTING, LUMP-CRUSHING AND MIXING MACHINE.—Niels K. Skow, Newton, Ia. A machine comprising a wheeled truck or frame, elevating mechanism mounted therein, traction-wheels mounted on the frame gear-wheels mounted on thhe traction-wheels, an oscillating frame mounted on the forward end of the main frame, a horizontally-vibrating screen arranged to receive sand from the elevating mechanism, a beater mounted over the screen and arranged to engage the sand thereon, and receptacles mounted on the main frame and arranged to receive articles from the surface of the screen.

725,895. PROCESS OF EXTRACTING GOLD.—Manuel V. Uslar, Gross-Lichterfelde, near Berlin and Georg Erlwein, Schöneberg, near Berlin, Germany, assignors to Siemens & Halske Aktiengesellschaft, Berlin, Germany. A process for extracting gold from auriferous ores which consists in lixiviating the ores with a solution of potassium cyanide, hyposulphates and sodium chloride.

725,904. PROCESS OF MANUFACTURING COKE.—John F. Wilcox, Cleveland, Ohio, assignor to Retort Coke Oven Company, Cleveland, Ohio. A process of manufacturing coke in retort-ovens, consisting in forming the charges outside the ovens, entering into the ovens the charges so that a portion or portions of the same be spaced apart, and heating said charge in said ovens.

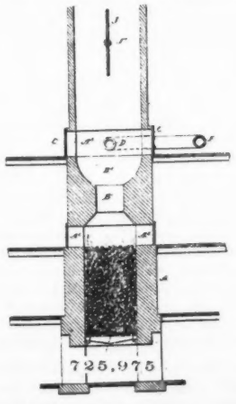
725,932. PULP DISTRIBUTER AND FEEDER.—Louis Cohen and John Gross, Sombrerete, Mexico. A distributing



feed device for ore-pulp or similar material containing one or more rotatable rolls consisting of a cylindrical hollow body having closed end portions, and a perforated or foraminated curved bounding-surface.

725,936. MELTING-FURNACE.—James F. Cottrell, Albany, N. Y. A melting-furnace comprising a fire box, a metal-chamber arranged rearwardly of the fire-box and a crucible-chamber arranged rearwardly of the metal-chamber and provided with a chimney or escape-flue, said fire-box, metal-chamber and crucible-chamber being in communication, and metal-chamber being depressed below the bottom of the crucible-chamber and below the top of the fire-box and provided with a concave bottom, said fire-box being also provided with pipes for supplying air thereto under pressure above and below the grate therein and the pipes above the grate being so arranged as to drive the flames back into the metal-chamber and over the metal therein, and said metal-chamber and crucible-chamber being each provided in the top thereof with openings having removable covers.

725,975. CEMENT KILN.—William W. Maclay, Glens Falls, N. Y. A continuous-burning Portland-cemented kiln,



having a regulatable suction device connected with the kiln at a point above the zone of most intense combustion.

725,998. ELECTROLYTIC SEPARATION OF COPPER AND NICKEL FROM MATTES OR ORES.—Ernst A. Sjöstedt and Joseph H. James, Sault Ste. Marie, Canada, assignors to Francis Hector Clergue, Sault Ste. Marie, Canada. An electrolytic process of separating copper and nickel from mattes and ores, consisting in concentrating, crushing and desulphurizing matte or ore, dissolving out the metals by dilute sulphuric acid heated to the boiling temperautre, diluting the cool liquor sufficiently to redissolve the salts which have crystallized out in cooling and thus bringing it to the point at which it will just hold the salts in solution, electrolyzing the solution with a current of normal density of about 0.3 amperes per 100 square centimeters of cathode-surface while being agitated with a current of air until most of the copper has been deposited and the deposit begins to darken, running off the solution to treat fresh matte or ore, repeating the electrolysis and solution as before as often as profitable and finally depositing as much as possible of the copper in an adherent form by reducing the current whenever the copper deposit begins to appear dark, nearly neutralizing the remaining solution with caustic soda then making it ammoniacal, oxidizing the iron by a blast of air, filtering off the precipitated ferric hydrate and electrolyzing the liquor to deposit the nickel (using nickel cathodes and graphitized carbon or other insoluble anodes) with a current of normal density of from 0.6 to 0.9 amperes per 100 square centimeters of cathode-surface while heated to 80° or 90° C. and agitated by a current of air, substantially as set forth.

726,026. PROCESS OF WELDING.—Ferdinand E. Canda, New York, N. Y. A process of welding metal plates and the like, which consists in forming channels between the welding-surfaces of the objects to be welded, applying flux to such surfaces and placing them together and then heating the objects and applying pressure to weld them and to force the molten flux out through said channels.

726,036. PROCESS OF UTILIZING SULPHITE LYES.—Viggo Drewsen, New York, N. Y., and Lauritz J. Dorenfeldt, Trondhjem, Norway. A process of utilizing the waste liquors of sulphite and soda pulp mills, which consists in neutralizing the sulphite-mill liquor containing salts of organic sulphonic acids with the liquor from the soda-pulp mill containing sodium sulphide concentrating the neutralized liquor, calcining the concentrated liquor, leaching the residuum obtained thereby, treating the solution thus obtained with burnt lime, and draining off the soluble sodium salts for further use.

726,066. MINING COLUMN-BAR.—August Johnson, Butte, Mont. In a mining column-bar, the combination of the hollow base or support having the opening on one side and the bearing on the other side, the protecting-cover for the opening, the shaft mounted in the bearing, the bevel-pinion on the inner end of the shaft, the disk on the outer end of the shaft having openings to receive a lever for turning said disk, the vertical screw mounted in the hollow base, the bevel-gear therein meshing with the bevel-pinion, and the column-bar connected with said screw and adjusted thereby.

726,076. PROCESS OF MAKING SULPHURIC ANHYDRIDE.—Max Le Blanc, Carlsruhe, and Constantin Krauss, Höchst-on-the-Main, Germany, assignors to Farbwerke, vorm Meister, Lucius & Brüning, Höchst-on-the-Main, Germany. A herein-described process of obtaining SO_3 from gases containing approximately 7 per cent of SO_2 and 9 per cent of O by means of the contact method, which consists in conducting the gas mixture through a first portion of contact substance at a temperature of approximately 500° C. and of approximately 120 liters of pyrites-burner gases per kilogram platinum-asbestos, and then directly conducting the resulting gas mixture at the same speed through a second portion of contact substance at a temperature of approximately 400° C.

726,091. PROCESS OF REVIVING HYDRATED SILICATE.—Charles A. McKerrow, Manchester, England. A process for the preparation and revivification of a hydrous silicate which consists in subjecting it in a closed vessel to the action of steam so as to dampen the silicate and heating to 212° F.

726,098. CONVEYER.—John B. Pitchford, Randfontein, Transvaal, South Africa. A conveyer comprising an inclined endless belt, a sump at the lower end of said belt, a suction pump for drawing material from the sump, and a discharge-nozzle leading from said pump to a point over the upper stretch of the conveyer-belt.

726,111. DRILLING APPARATUS.—John C. Swan, Marietta, Ohio. In a well-drilling apparatus, a vertically-arranged cylinder, having one end closed, a plunger arranged within the cylinder, means for supporting one of these parts, the other being movable, means for introducing fluid under pressure between the plunger and the closed end of the cylinder to raise the movable part relative to the other, and a rope-clamp connected to the movable part and located below its lower end in line with its center.

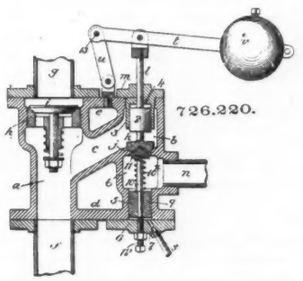
726,130. PROCESS OF MAKING LEAD SUCRATE.—Alfred Wohl, Charlottenburg, Germany. An improvement in the art of sugar manufacture, which consists in adding to an impure alkaline sugar-containing solution a quantity of lead oxide, at a rate below the rate of crystallization of the thus-formed bisucrate, and removing the crystallized bisucrate from the mass.

726,136. BRIQUETTE MOLD.—Joseph W. Bramwell, Philadelphia, Pa., assignor to Falkenau-Sinclair Machine Company, Philadelphia, Pa. A briquette-mold having projecting ears and clamping-levers with hardened wearing pins or bars inserted in the meeting faces of said mold-ears and clamping-levers.

726,173. CONTINUOUS HEATING-FURNACE.—Alexander Laughlin, Sewickley, and Joseph Reuleaux, Wilkinsburg, Pa., said Reuleaux assignor to said Laughlin. A continuous heating-furnace having, in combination, a discharge-opening at or near the rear end of the furnace, a fire-chamber within the furnace adjacent to such opening, said fire-chamber opening directly into the heating-chamber, supports for the materials being heated extending from the front end of the furnace over the fire-chamber to the said discharge-opening, and a cleaning-pit beneath the heating-chamber in rear of the inner wall of the fire-chamber, such fire-chamber having openings in said inner wall about on line with the fire-bed, and also having ash removal openings in its end wall.

726,174. WELL-DRILLING MACHINE.—John R. Lewis, Weatherford, Tex. In a well-drilling machine, the combination of a master-wheel, means to rotate the same, a crank-shaft on which the master-wheel is mounted, a drill-operating element actuated by the crank-shaft, means to lock the master-wheel to the crank-shaft and to permit it to rotate independently thereof, a drill-rope drum, operating connections therefor including an element shiftable into and out of engagement with the master-wheel, a counter-shaft driven by the master-wheel, a mud-bucket drum, and means to gear the same to the counter-shaft and disconnect it therefrom.

726,220. UNLOADING DEVICE FOR AIR OR GAS COMPRESSORS.—William S. Fairhurst, Brooklyn, N. Y., assignor of one-half to John J. Riley, Brooklyn, N. Y. In an unloading device for a compressor, a chamber in which is a valve-seat, an upwardly-opening relief-valve adapted to said seat, a loading device applied to said valve for closing it, a cylinder in said chamber below the valve-seat



having its lower part in communication with the receiver to which the compressor delivers, a piston in said chamber, a communication between said chamber and the outlet of the compressor above said valve, an outlet from said chamber to the atmosphere between said valve and piston, a spring interposed between said piston and valve for opening the latter and an adjusting-screw in the bottom of said cylinder for adjusting the piston therein to adjust the force exerted by said spring for opening the valve.

Reissue No. 12,105. DESULPHURIZING SULPHIDE ORES.—Arch. D. Carmichael, Broken Hill, N. S. W., Australia. Original No. 705,904, dated July 29, 1902. A process of treating mixed sulphide-ores, which consists in mixing with said ores a sulphur compound of a metal of the alkaline earths, starting the reaction by heating the same, thereby oxidizing the sulphide and reducing the sulphur compound of the alkali metal, and passing a current of air to oxidize the reduced sulphur compound of the metal of the alkalies.

GREAT BRITAIN.

The following is a list of patents published by the British Patent Office on subjects connected with mining and metallurgy:

Week Ending April 4, 1903.

5,482 of 1902. MAKING GRAPHITE.—A. B. F. Ludwig, Mulheim, Germany. Apparatus for making graphite out of carbon by suddenly heating to over the melting point by an electric current in an atmosphere of inert gas.

5,531 of 1902. BRIQUETTING FINE IRON ORE.—A. Ronay, Budapest, Hungary. Binding fine iron ores into briquettes solely by means of great pressure, the contained water being sufficient to make the mass plastic and adherent.

7,923 of 1902. DEPOSITING ZINC ON IRON.—E. Goldberg, Moscow, Russia. Adding a nitrogenous organic compound such as pyridine to electrolytic bath for depositing zinc on iron, to give a whiter and harder deposit.

10,599 of 1902. BALL MILL.—H. Hinz, Gressen, Germany. A ball mill, the balls being of different sizes and pressed by centrifugal force into an annular ring formed by two surfaces rotating in opposite directions.

19,035 of 1902. LEACHING COPPER ORES.—W. Payne and J. H. Gilies, Orange, New South Wales. Roasting copper ores, then saturating with ferrous sulphate to convert all copper into soluble form, and afterwards leaching with water.

1,560 of 1903. COKE CONVEYOR.—M. Graham, Leeds. Improvements on the inventor's hot cake conveyors, so as to drain the coke of all superfluous water.

ANNOUNCEMENT.

We find it desirable to state that the company owning THE ENGINEERING AND MINING JOURNAL has not purchased and will not purchase *The Pacific Coast Miner*, with which publication intimate relations have been maintained for the past four months. The ENGINEERING AND MINING JOURNAL is in a particular sense the organ of the mining and metallurgical professions of America, and while we wish well to all those who are doing good work in their respective fields of activity, it is found inexpedient to form an alliance with any local paper anywhere.

TO ENGINEERS VISITING NEW YORK.

A room for the exclusive use of visiting mining engineers is maintained at the New York office of THE ENGINEERING AND MINING JOURNAL. Visitors to the metropolis are cordially invited to take advantage of the facilities it offers, by having their mail addressed in care of the JOURNAL and making its office their headquarters. The managers of the branch offices will also be glad to welcome visiting engineers and to be of any service to them that they can.

We are informed that the Institution of Mining and Metallurgy offers to all members of the American Institute of Mining Engineers non-resident in Great Britain, the privilege of free use of the Institution offices and library in Salisbury House, London Wall, E. C. Visiting engineers may have their letters addressed to the offices of the Institution and thus enjoy the advantages of temporary office accommodation in the city of London.

PERSONAL.

Mr. Howard D. Smith, of Berkeley, Cal., is now at Denver.

Mr. W. L. Austin, of New York, is at Cananea, Sonora, Mex.

Mr. H. B. Starbird is manager of the Rose Mine at Victor, Cal.

Mr. Jas. Douglas sails from Liverpool for New York on May 2.

Mr. Horace V. Winchell, of Butte, Mont., has gone to British Columbia.

Mr. W. R. Feldtmann has returned to London from West Australia.

Mr. N. Treweek, of Salt Lake City, Utah, is taking a trip through California.

Mr. C. W. Kempton, of New York City, has gone West on professional business.

Mr. Ben B. Lawrence, of New York, has gone to Lead City, S. D., on professional work.

Mr. Hal. W. Hardinge, of Denver, sailed for London per S. S. *Ryndam* on April 29.

Mr. H. E. T. Haultain, a mining engineer, of Nelson, B. C., has been visiting Republic, Wash.

Prof. C. R. Van Hise has been chosen president of the University of Wisconsin, at Madison, Wis,

Mr. J. H. Henley is now manager of the Valley leasing and Mining Company at Leadville, Colo.

Mr. R. L. Hammond, of Iron Mountain, Mich., has been in Salt Lake, Utah, on mining business.

Mr. L. H. Beckwith has been appointed manager of the Field's Reward Gold Mines, West Australia.

Mr. Walter H. Aldridge, manager of the Canadian Smelting Works, at Trail, B. C., is in New York City.

Mr. Ernest L. Godbe, of Salt Lake, has been inspecting the Ella Hill properties in the Neal District, Idaho.

Mr. F. L. Ransome, of the United States Geological Survey, was in New York City during the past week.

Mr. L. C. Trent has returned to Salt Lake City, Utah, from an examination of mining properties at Pioche, Nev.

Mr. George S. Binckley is general manager of the Esperanza Mining Company, on Cedros Island, Lower California.

Mr. F. Mott, consulting engineer of the Los Coches Mine, Los Coches, Sonora, Mex., has been in San Francisco, Cal.

Mr. C. C. Burger is now an assistant to Mr. J. Hays Hammond, and is in charge of investigations at Tonopah, Nev.

Mr. H. L. Frank, owning coal properties at Frank, Alberta, Canada, recently went to Paris, France, on business.

Mr. T. B. Marriott has left London for the West Coast of Africa to become manager of the Himan Concessions, Limited.

Mr. R. W. Powell, mine manager, of the Thames District, New Zealand, sailed from New York on the *Etruria* on April 25.

Mr. D. C. Jackling and other officials of the United States Reduction and Refining Company, have been at Salt Lake, Utah.

Mr. Robert J. Coleman, formerly manager for Mr. Samuel Newhouse, is at the Manhattan Hotel, New York City, for a few days.

Mr. C. R. Smith is manager and superintendent of the Wilson Mining and Milling Company at Stein's Pass, Grant County, N. M.

Mr. C. W. Pritchett, of Denver, Colo., left there a few days ago for Sonora, Mex., on professional business to be gone about a month.

Mr. Adolph Franke, assistant director of the Berlin works of the Siemens & Halske Company, of Germany, is at present in America.

Mr. E. F. Olden, a well-known milling man of Black Hawk, Colo., has returned from a visit of several weeks to the Pacific Coast.

Mr. Edward H. Liveing has been appointed consulting engineer for the Iron Dike and Associated Mines of Kalgoorlie, West Australia.

Mr. E. B. Kirby, of the War Eagle and Center Star mines, at Rossland, B. C., was recently in San Francisco, Cal., on company business.

Mr. H. E. Whipple, constructing engineer of the Butters' reduction works, near Virginia City, Nev., has gone to Mexico for the same company.

Mr. J. S. Randles, chairman of the Moss Bay Hematite Steel Company, has been elected president of the British Iron Trade Association.

Mr. John R. Stanton, of New York City, has been visiting the properties with which he is connected in the Lake Superior copper districtj.

Mr. C. L. Dignowity, who has for several months been giving attention to properties in North Carolina, Utah and Colorado, has opened his Philadelphia office again.

Mr. M. Carper, of Johannesburg, one of the engineers of the Eckstein mines, in South Africa, has been stopping at the Auditorium Hotel, Chicago.

Mr. H. G. Heffron has resigned as manager of the ore purchasing department of the Bingham Consolidated Company, and will go to New Mexico.

Mr. F. Longmaid, of Oakland, Cal., has been appointed superintendent of the Velardena Mining and Smelting Company at Velardena, Durango, Mex.

Mr. E. G. Spilsbury has returned from his visit of inspection to the potash mines in Germany, owned by the Virginia Carolina Chemical Company.

Mr. Martin J. Heller, of San Francisco, Cal., is now general manager of Capt. J. R. De La Mar's mines, near Tucson, Ariz., succeeding Mr. H. A. Cohen.

Mr. Alexander Burrell, manager of the Montana Mining Company, of Marysville, Mont., is now in London, to attend the annual meeting of the shareholders.

Mr. Peter Ruppe, of Calumet, Mich., is on a short visit to the Calumet & Arizona Mining Company's property at Bisbee, Ariz. He is treasurer of the company.

Mr. M. E. Hilon, of Deadwood, S. D., former manager of the Columbus plant, is instructor in chemistry and assaying at the Nebraska State University at Lincoln.

Mr. Firmin Desloge, Sr., a graduate of the Massachusetts Institute of Technology, has succeeded Mr. H. D. Quimby as superintendent of the Deloge Lead Company.

Mr. Shinji Harada, of Tokyo, Japan, consulting engineer to the Mitsubishi Mining Company, on his way home from the Rand, is visiting Butte, Salt Lake and Denver.

Mr. R. W. Pringle, attached to the office of A. A. Blow, passed through Denver, Colo., last week, on his way to New South Wales, via San Francisco, on professional business.

Mr. W. J. Sharwood, of Berkeley, Cal., has returned to Marysville, Mont., where for several years past he has had the superintendency of the cyanide plant at the Drum Lummon Mine.

Mr. Charles Briggs, of Calumet, Mich., president of the Calumet & Arizona Mining Company, and heavily interested in Cochise County, Ariz., mining properties, has left for a few days' visit to Bisbee.

Mr. H. B. Meloy, of Washington, D. C., is in Gilpin County, Colo., in the interests of United States Geological Survey, securing statistics and information regarding the mineral resources of that section.

Mr. J. B. Orr, of the engineering and contracting house of James Mitchell & Co., of Rio de Janeiro and San Paulo, Brazil, which represents the Brazilian branch of the General Electric Company, Babcock & Wilcox, etc., has been in Cincinnati.

Mr. E. H. Hamilton, superintendent of the United States Zinc Company's smelter at Pueblo, Colo., now in course of construction, has resigned and accepted a position with the Anaconda Copper Company. Mr. H. J. Hardess has been appointed in his place.

Messrs. Washington Porter, Dr. J. E. Gilman and F. R. Chandler, all of Chicago, Ill., were recent visitors at Central City, Colo., on their return from the Pacific Coast. They are stockholders in the New National Tunnel Mining Company, operating east of Black Hawk.

Mr. J. Hays Hammond has severed his connection with the Venture Corporation, Limited, of London. While retained exclusively by the Guggenheim Exploration Company, of New York, he remains consulting engineer to the Camp Bird Mine, in Colorado, and the Tonopah mines in Nevada.

Mr. F. E. Drake has been elected president of the Lanyon Zinc Company, vice Mr. J. S. Rodgers, who has been made managing director. Mr. Drake was formerly director of machinery and electricity at the Paris Exposition of 1900, and has but recently returned to the United States from Berlin, where he has been doing special advisory work for a large electrical manufacturing concern.

Mr. J. E. McAllister, for some time past assistant superintendent at the Tennessee Copper Company's smelter at Copperhill, Tenn., has been appointed superintendent of the British Columbia Copper Company's smelter at Greenwood, B. C., in succession to Mr. Paul Johnson. Mr. McAllister, who is about 36 years old, graduated as civil and mining engineer from the Ontario School of Practical Science, Toronto, Ont., in 1890, and was with the Dominion Bridge Company, and later with the New Jersey Steel and Iron Company. Returning to Toronton he entered the post-graduate class in Applied Sciences at the Toronto University, and later took a special course in mining and metallurgy at the Michigan College of Mines, Houghton, Mich. In the fall of 1897 he joined the staff of the Trail Smelter under Mr. H. C. Bellinger, then superintendent of Mr. F. Augustus Heinze's smelter, known as the works of the British Columbia Smelting and Refining Company, Limited. When these works were sold to the Canadian Pacific Railway Company, Mr. McAllister became confidential secretary to Mr. Heinze's chief engineer, Mr. W. F. Tye, Later Mr. McAllister was with the Hamilton Steel Company, at Hamilton, Ontario, and about 1900 entered the employ of the Tennessee Copper Company, soon advancing to the position of assistant superintendent.

OBITUARY.

Louis Stadt Mueller, mining engineer and chemist, who for many years was in charge of the mineralogical cabinet of the Sheffield Scientific School of Yale, died recently at the home of his son, in New Haven, Conn. He was about 84 years old.

S. Morgan Smith, head of the S. Morgan Smith Company, manufacturing water-wheels and power transmission machinery in New York City, died of heart failure at Los Angeles, Cal., on April 12. He was born in Davis County, N. C., February 1, 1839, was graduated from the Moravian College at Bethlehem in 1861, and became pastor of a Moravian church at York, Pa. In 1871 he had to give up the ministry on account of a serious throat affliction, and turned his attention to machinery. In 1875 he became interested in the manufacture of water-wheels, and put on the market the Success and Improved Success wheels, many hundreds of which are in use in this country and abroad. In 1892 he began the manufacture of the McCormick wheel, which has gained an even greater reputation. He is survived by a widow and six children.

Victor M. Clement, a prominent mining engineer, who was one of the men arrested and imprisoned by the Boer officials at the time of the Jameson raid, died at Saltillo, Mex., on April 26, from blood poisoning following a surgical operation. Mr. Clement was born in San Francisco, Cal., about 47 years ago, and studied for a time at the State University at Berkeley. He took up mining work and won a deserved reputation while still a young man. He was in turn superintendent of the Bunker Hill & Sullivan Mine at Wardner, Idaho; manager of the Simmer & Jack Mines in the Transvaal; consulting engineer in West Australia; associated with Capt. J. R. De La Mar in the direction of mines in Utah, Nevada and California, and recently had been operating mines near Mazapil, Zacatecas, Mex. During his career, Mr. Clement showed great energy in his work. A large number of friends and acquaintances will mourn his death. His wife, who survives him, was his companion in his journeys, and was by his side at the end.

Irving M. Scott, who for many years was vice-president and general manager of the Union Iron Works, at San Francisco, Cal., died at his home in that city on April 28. He had been in poor health from kidney trouble for some time. Mr. Scott was born of Quaker parentage at Hebron Mills, Baltimore County, Md., in 1837, and was educated at the Milton (Ind.) Academy and the Baltimore Mechanics' Institute. After being employed in factories in Baltimore and other cities and becoming an expert

engineering draftsman, he went to California. He designed much of the machinery for working the famous Comstock mines, and invented many machines. He was president for several terms of the Mechanics' Institute and of the Art Association of San Francisco, regent of the University of California, and a trustee of the Leland Stanford, Jr., University. The Union Iron Works while building all manner of mining machinery, gained international fame from the performance of the battleship *Oregon*.

Josiah Willard Gibbs, professor of Mathematical Physics at Yale University, and a scholar of international fame, died suddenly at his residence in New Haven on April 28 from heart trouble. He was born in New Haven, Conn., on February 11, 1839. After graduating from Yale in 1858 he pursued special studies in mathematics, and went to the universities at Paris, Heidelberg and Berlin. In 1871 he became professor of Mathematical Physics in Yale, a position he continued to hold. His work was principally in the development of graphical and analytical methods in thermo-dynamics, and for his researches the American Academy of Arts and Sciences gave him its Rumford medal. In 1879 he was elected a member of the academy, and he was vice-president of the American Association for the Advancement of Science in 1886. His publications include many standard works on his chosen subject, and in late years he had been especially noted for his system of vector notation, simpler than that of quaternions and more approximating to the German notation.

SOCIETIES AND TECHNICAL SCHOOLS.

COLORADO STATE SCHOOL OF MINES.—Owing to continued friction among the members of the faculty and between the faculty and the students, the board of trustees has decided to accept the resignations of President Palmer and all the members of the faculty, the resignations to take effect June 30. The school year is nearly ended, and it seems probable that an entirely new staff of professors will continue the work of the school next year.

NATIONAL ACADEMY OF SCIENCES.—At the recent meeting in Washington, Dr. Ira Remsen, of Johns Hopkins University, was elected vice-president. Prof. Simon Newcomb, of Washington, foreign secretary. Additional members of the academy council elected were: J. S. Billings, New York; H. P. Bowditch, Boston; G. J. Brush, New Haven; C. D. Walcott, Washington; W. H. Welch, Baltimore; George E. Hale, Williams Bay, Wis. Foreign associate members elected were: Ricard, Paris; Pfeffer, Leyden; J. J. Thompson, Cambridge, Eng.; Brogger, Christiania; Lankester, London; Vogel and Koch, Berlin; Mendelesff, St. Petersburg, and Zirke, Leipsic.

INDUSTRIAL NOTES.

The Carborundum Company, of Niagara Falls, N. Y., has determined to build a plant in Prussia.

The C. O. Bartlett & Snow Company, of Cleveland, O., has received an order for a drying equipment to be installed in the mines of the Payne Consolidated Mining Company, Sandon, B. C.

Adam Schilling Sons, of San Francisco, Cal., manufacturing the Golden Gate gas engines, recently shipped a 30-h.p. distillate hoisting outfit to the Karma Mining Company, near Mohave, Cal. It is intended to raise ore from a depth of 500 ft.

The Lidgerwood Manufacturing Company has secured a contract for steam hoisting engines to be shipped to Torreon, Mex. An order has also been secured from South Africa for five hoisting engines for shipment to Fraser & Chalmers, Limited, Johannesburg.

The Brown-Corliss Engine Company, of Corliss, Wis., has received an order from a mill at Newton, Mass., for a 16 and 26 by 42 cross-compound Corliss engine, and also an order from the Berlin Mills Company, of Gorham, N. H., for four 24 by 42-in. simple Corliss engines.

The Wheeling Steel and Iron Company, of Wheeling, W. Va., recently shipped 18 miles of pipe to be used in mining work to a company operating near the Chilkoot Pass, Alaska. The pipe consists of 8 miles of 3-in., 1 mile of 6-in., 2 miles of 4-in., 5 miles of 2-in., and about 2 miles of 8-in. The weight of the material was about 500 tons.

The Rand Drill Company, of New York City, through its pneumatic tool department, reports the recent sales of many large complete air plants, including the new Imperial pneumatic hammers and piston air drills. Plans are now being drawn for an extensive enlargement of the Rand Drill Company works to meet these increased demands.

The Austin Manufacturing Company, of Chicago, Ill., recently received an order for two No. 5 gyratory crushers for Brisbane, Australia, and the same day a cable order from the Railway Commissioner at Adelaide for an Austin railway grader. The company also secured an order from the Quaker-Portland Cement Company, of New York City, for four No. 5 gyratory crushers.

At the annual meeting of the stockholders of the United States Steel Corporation, at Hoboken, N. J., the following directors were re-elected for three years: Francis H. Peabody, O. H. Steele, W. M. H. Moore, Norman B. Ream, P. A. B. Widener, Jas. H. Reed, H. C. Frick, and William E. Denborn. The body of directors will meet on May 5 for the purpose of electing a president.

The Stanley Electric Manufacturing Company has sold the following apparatus to the New York Edison Company, supplementing the $500,000 contract reported some months ago; 1,000 kw. S. K. C. generators and 7 150 kw. booster sets. The Stanley Electric Manufacturing Company has also contracted to furnish 3 550 kw. S. K. C. synchronous motors to the Municipal Gas Company, of Albany, N. Y.

The late Herr Krupp's various works in Prussia have been organized into a joint stock company, with $40,000,000 capital, under the designation of the Friedrich Krupp Company. Former Public Works Minister Thielen is vice-president of the board of directors. The manager is ex-Landrath Roetger. The stock, which is not listed on the Bourse, remains in the hands of the Krupp family.

The Roberts Steam Piston Packing Company, of Baltimore, Md., has been incorporated with a capital of $250,000, to manufacture steam piston packing for cylinders. Edward E. F. Roberts, of Philadelphia, Pa., is president; George M. Roberts, Baltimore, vice-president and general manager; M. J. Kilroy, Atlantic City, N. J., treasurer, and Bernard Reilly, of Baltimore, secretary. Company's headquarters will be at Atlantic City, N. J.

The American Smelters' Steamship Company, recently organized for the purpose of transacting a general business to New York, Galveston and other ports of the United States, Mexico and South America, has chosen S. W. Eccles vice-president and general manager; Isaac Guggenheim treasurer; F. W. Hills controller; H. B. Tooker secretary and J. K. MacGowan managing and purchasing agent.

Fairbanks, Morse & Co., through their Denver office, recently shipped a car-load of machinery to Idaho Springs, Colo., for the Lucania Tunnel. The shipment included a 34-h.p. gasoline engine and air compressor. The engine has a gas generator, the fuel to be used being Boulder crude oil. Fairbanks, Morse & Co. are also supplying gasoline engines for the Castle Creek Placer Company at Mystic, S. D., and the Power Mining and Milling Company, at Central City, Colo.

The Wilson Foundry and Machine Works, of Kanawha Falls, W. Va., capital $30,000, has been incorporated to manufacture and sell car wheels, chutes, scales and appliances used in connection with coal tipples and inclines. The incorporators are: J. Turner Morehead, George F. Seward, of New York City; John A. Wilson, of Kanawha Falls, W. Va.; S. L. Walker, J. C. Wheeler, Jr., and R. J. Thrift, of Fayetteville, W. Va., and S. A. Hutchinson, of Oak Hill, W. Va.

The electric drill equipment for the Majestic Mining and Smelting Company at Milford, Utah, sent out by the Mine and Smelter Supply Company, of Salt Lake, embraced a Model gasoline engine and complete electric apparatus for 20 Durkee drills. The Mine and Smelter Supply Company has also filled an order for an electric Durkee drill for Tonopah, Nev., and has shipped a 10 by 14 double-cylinder and double-drum reversible geared hoisting plant, of its own make, to an Idaho mining company.

At a special meeting of the Salford, Eng., Borough Council recently, a contract for 50 tram cars at approximately $3,700 each was given to the Westinghouse Company. The London County Council recently received tenders covering the switchboard installations for the sub-stations at the Elephant and Castle, New Cross and Camberwell for the tramways, the contract being awarded to the British Westinghouse Electric and Manufacturing Company, Limited. This contract amounts to approximately $27,000.

The Northern Engineering Works, of Detroit, Mich., reports recent sales of electric traveling cranes to Lambert Hoisting Engine Company, 2d order; Fort Pitt Bridge Works, 4th order; Sessions Foundry Company; Waterbury Machine Company; Union Carbide Company; Webster, Camp & Lane Company, and hand cranes to Clarage Foundry Company; Northern Electrical Works, and a long list of other well-known concerns. The Northern Engineering Works say trade conditions are better than during the corresponding period last year.

The Allis-Chalmers Company reports the following partial list of engines sold in March: Carnegie Steel Company, Pittsburg, Pa., one 42 and 66 by 60 tandem rolling mill engine; Oliver Iron Mining Company, Duluth, Minn., one 16 by 36 1890 frame Reynolds Corliss engine; Woodward Iron Company, Woodward, Ala., three 44 and 84 by 60 vertical long cross-head blowing engines: South Side Elevated Railroad Company, Chicago, Ill., one 34 and 70 by 54 1890 horizontal cross-compound Reynolds Corliss engine; Illinois Steel Company, Chicago, Ill., two 46 and 86 and 84 by 60 vertical Steeple cross-compound blowing engines; International Traction Company, of New Jersey, Jersey City, N. J., two 34 and 68 by 48 1890 cross-compound condensing Reynolds Corliss engine; Scranton Bolt & Nut Company, Scranton, Pa., one 18 by 36 1890 frame Reynolds Corliss engine, Griffin Wheel Company, Chicago, Ill.; one 18 by 48 1890 frame Reynolds Corliss engine, with compressor attachment; Pennsylvania Railroad Company, Pa., one cross-compound Riedler air compressor, 15 and 24 by 36; Wild Goose Mining and Trading Company, Alaska, spare parts for Riedler pumping engine; Charles Butters & Co., Limited, Mexico, one Reynolds 1890 right-hand Corliss engine, 14 by 42, two horizontal tubular boilers, E. C. 66 ins. by 16 ft.

TRADE CATALOGUES.

The Joseph Dixon Crucible Company, of Jersey City, N. J., continues to send out printed matter calling attention to the excellence of its silica-graphite paint as a protective coating for tin roofs and for all exposed iron and steel surfaces.

The Nernst Lamp Company, of Pittsburg, Pa., through the H. C. Roberts Electric Supply Company, of Philadelphia, has secured the contract for lighting the new Roberts Hall, Haverford College, Haverford, Pa., with 2, 3 and 6-glower Nernst lamps. The main auditorium of the college is also to be lighted by Nernst lamps.

The Heclon rock and ore breaker, described as a perfect gyratory stone-crusher, is made by Hadfields Steel Foundry Company, Limited, Sheffield, England. This breaker is constructed almost wholly of steel, the crushing cone and the concaves being of a patent manganese steel specially designed to resist abrasive and crushing action. In breaking hard stone to 2½ in. ring, the estimated power required is 1 h.p. per ton of stone broken per hour.

Catalogue No. 7-C, published by the Colorado Iron Works Company, of Denver, Colo., is a pamphlet of 96 pages, entitled "Concentration Mills and Machinery." It gives some general hints on the concentration of ores and the erection of concentrating plants, and then describes the grizzlies, ore feeders, rock-breakers, crushing rolls, hydraulic classifiers, screens, jigs, elevators, etc,, made or carried in stock by the company. The company makes the Bartlett table and contracts to build completely equipped concentrating plants.

The Locomotor engines built by the Buffalo-Pitts Company are described in a 40-page circular sent out from the company's headquarters, at Buffalo, N. Y., which states that the company's engines are divided into five general classes: single cylinder traction engines made in seven sizes up to 30 h.p.; double-cylinder traction engines, in three sizes, up to 22 h.p.; double-cylinder hauling engines, in three sizes, up to 35 h.p.; double-cylinder road locomotives for hard service in hauling heavy loads, long or short distances and single or double-cylinder portable engines, built in 12 sizes. The company also makes a line of wagon cars to be used, single or in train, for carrying stone, ore, lumber or general merchandise. The pamphlet contains copies of numerous letters testifying to the excellence of the company's product.

SPECIAL CORRESPONDENCE

Denver. April 25.

(*From Our Special Correspondent.*)

It has been given out that at the annual convention of miners in Denver on May 25 a movement will be started for an 8-hour day in all mining districts, which come under the organization. Of the members of unions and others affiliated with the Federation, about one-third are reported enjoying an 8-hour day. It is alleged that the Smeltermen's Union is gaining strength and soon will be in a position to make the demand.

According to the reports of the Colorado Bureau of Mines, taking the gold, silver, lead, copper and zinc at current market values, the gross value of the output of the State for 1902 was $44,708,896. The average number of men engaged in mining, milling, smelting and hauling ore (exclusive of employes in general offices of corporations, mining brokers and promoters, mining and consulting engineers, United States deputy mineral surveyors, etc.), during 1902 was 35,118. The gross value of the ore, divided by the number of men so employed, gives a per capita production for 1902 of $1,273 for each man. The lowest paid minig labor, "muckers," in the lowest wage mining districts, gets $2.50 per day, which at 26 days per month and 12 months per year, means $750 per annum; wages range as high as $4.50 and $5

per day for skilled labor, such as timbermen, machinists, etc.

It is therefore probably conservative to say that of the $1,273 per capital production of the State during 1902 at least $800 represents fages, leaving a balance of $473 to be divided between cost of supplies, railroad freight and interest on the vast sums invested in mines and ore treatment plants. On the face of it, labor gets an undue proportion of the gross value and has the further advantage of preferred payment.

Taking the best counties, four of the largest producers show respectively per capita productions, for 1902, of $2,856, $1,907, $1,715 and $1,651. Four less favored but prominent mining counties show respectively per capita productions, for 1902, of $987, $784, $739 and $375. In the first of these four counties therefore almost the entire proceeds of the ore output go in wages, leaving a totally inadequate amount for supplies, freight and interest on the large amount of capital invested in mining and ore treatment properties. In the other three last mentioned counties, the total value of the ore produced does not pay wages alone, to say nothing of the other items, and the deficiency is necessarily made up by the influx of new capital furnished by optimistic investors, or speculators variously beguiled by promoters, and buoyed up by the hope of finding "bonanza" mines. Bonanza mines, however, are the exception and not the rule.

The ever increasing demands for shorter hours and increasing pay on the part of wage earners in the mining industry must necessarily cause the above subject to be investigated more closely. With such investigation, the influx of new capital, which now supplements the deficiency of ore values in some districts, will, to say the least, be materially diminished. The inevitable result will be a marked curtailing of operations in the less favored mining districts, now furnishing employment to considerable numbers of men, simply because the money going in is so much more than the value of the ore coming out. With the closing of existing unprofitable mines and a marked decrease of new development enterprises, the men thrown out of employment must seek work elsewhere, and will naturally flock to the more favored mining districts, thus furnishing a greater supply of labor than demanded.

It looks as if this effect has already begun to show, as the number of men employed, directly and indirectly, in the mining industry of the State, is given by the reports as follows: 1899, 39,210; 1900, 40,111; 1901, 37,260; 1902, 35,118.

Judged by the returns, as shown by these official statistics, the mining industry in various districts of Colorado does not warrant even present hours and wages. How long the investing or speculating, or gambling public will continue gratuitously to furnish the capital necessary to pay miners high and full wages, irrespective of whether they produce ore equal in value to the amount of the wages they receive, merely to aid the Western Federation of Miners in its pursuit of utopian and socialistic ideals, remains to be seen.

The probability seems to be that capital will increasingly seek mining investments in Mexico and other countries where labor unions do not make unreasonable demands. It also seems probable that metalliferous mining in Colorado and in other states where union labor rules, will meet a considerable setback; the demand for miners will fall, and when the supply exceeds the demand, wages are likely to decline. In the event of any serious disaster to the metalliferous mining industry of Colorado, the men most responsible for it, having comparatively slight local interests, will simply seek fresh fields.

San Francisco. April 22.

(From Our Special Correspondent.)

The most absorbing topic in mining circles is the miners' strike in Amador and Calaveras counties. The men wanted 9 hours with 10-hour pay, and recognition of the unions. The strike was brought about by the Western Federation of Miners. Something over a thousand men quit work until their demands should be accepted. There has been no special intimidation. Some of the engineers in charge of pumping works were told to quit, but pumping continues at all the mines.

The mine owners issued a notice to the public—not a very effective or vigorous document—and also served a notice on the sheriff of Amador County, asking the appointment of deputies to protcet the mines and men. The Oneida Mine property is fenced in, and no strikers can interfere with the men at work, but other mines are not in the same position.

It is apparent that the mine owners, though organized for mutual protection, will hardly be able to stand out. Before the strike actually began not 25 per cent of the men had joined the unions; but now over 90 per cent are members. At one mine, with about 225 men, only 22 non-union men were left.

At the Gwin Mine, the only one disturbed in Calaveras County, all the men quit, but the managers agreed to a 9-hour day for the force, which was satisfactory to the miners. The management insists on 9 hours underground. It has been customary to include the time coming and going in the 10 hours. This hitch is yet unsettled. The questions of discrimination against the Western Federation of Miners, reinstatement of miners discharged for affiliation with the Federation and the hours of work are still unsettled.

The Oneida, Zeila, Kennedy, South Eureka and Central Eureka companies appealed to the sheriff. He answered that he had no information of any infraction of the law by members of the unions, but if any should occur it would be suppressed.

The great difficulty among the mine managers is to get them really to pull together. Some must depend on orders from directors in the East or abroad, and a telegram from the home office may make an entire change in plans. It looks as if concessions would be made by the managers, as practically all the miners in the counties affected have become members of the unions. Great loss of money would result in some cases from the entire stoppage of work. The Gwin, having given in to the 9-hour principle, it looks as if all the others would eventually follow suit. The other demands may be compromised.

At the Mountain Copper Company's property at Keswick, the strike still continues. Men who were accused of interfering with the officers have been discharged. Meantime the Mountain Copper Company is importing men by the car-load who have gone to work unmolested. There are about 1,000 men busy, enough for the present, though about half that number more will eventually be needed.

The old "mineral lands" fight between the railroad companies and the miners has started again, this time in Shasta County, where the railroad company advertised its intent to apply for patent for the odd numbered sections of its grant in that county. Sixty days' notice is given for filing protests, but unless some miner has a direct interest in particular land on the odd sections there will be no protest, and much mineral land may pass to the company. If a man has a claim he will naturally protest, but to identify and mark the ground entails a survey, an expense which all prospectors are not able to defray. The California Miners' Association spent many thousands of dollars trying to get Congress to make a systematic classification of the lands on the odd sections in the State, but Congress never took final action, and the lands are still unclassified. The odd sections, once patented to the railroad, are no longer open to location, and men will not prospect there.

It will be a surprise to some persons expecting immediate dividends from the California King Gold Mines at Picacho, San Diego County, to learn that a Colorado mining machinery firm has placed an attachment on the property. The mines have just begun shipping bullion after considerable expense for equipment. The company has been rather widely advertised in the East, and some prominent men are connected with its directory.

It has been the custom in California to use the hydraulic system for railroad and similar work in moving dirt. A contractor having a large fill at the Big Canyon trestle, near Dunsmuir, Siskiyou County, on the railroad line between San Francisco and Portland, Ore., is using this system. No mining has been done, but residents of the vicinity are appealing to the Anti-Debris Association, of Sacramento, to stop it. Whether the Anti-Debris people can stop a man hydraulicking when he makes no pretense to mine, is a question of considerable interest to the people in the mountain counties.

San Luis Potosi, Mex. April 21.

(From Our Special Correspondent.)

John Hays Hammond, E. A. Wiltsee and Senator J. P. Jones are now looking over mining properties in the Republic. Mr. Hammond will first examine the Dolores Mine, about 80 miles west from Minaca, in Chihuahua, the present western terminal of the Chihuahua & Pacific Railroad. Mr. Wiltsee examined the Dolores early in the year, and took about 10 tons of ore north for experiment. If Mr. Hammond now reports favorably the property will be bought, the reported price being around $2,000,000, gold. It is said that the mine is held in joint option by the Gugenheim Exploration Company and the Venture corporation. Mr. Hammond and Mr. Wiltsee have been traveling together.

E. W. King, of Oklahoma, has been preparing to leave Minaca for Topolotampo, on a prospecting trip over the line of the Kansas City, Mexico & Orient Railroad (of which Chihuahua & Pacific is a part). The road will open a fertile and rich mineral country, taking in the Dolores Mine, the Consuelo Mining, Milling and Power Company's properties, La Luz Mining Company in Maguariche District, and on to Urique, in Chihuahua, at which point Los Angeles, Cal., men have bought for $75,000, gold, the Nueva Anaconda Copper Mine adjoining the old Bahuerachic mines. At the other end of this branch of the Kansas City, Mexico & Orient Railroad, near the city of Chihuahua, in the Santa Eulalia District, the output is steadily increasing, and shipments are over 20,000 tons a month. Throughout the State new work continues to attract attention. At Parral the Hidalgo Mining Company is reported to have made another strike in the San Juanico Mine; the Terrenantes Consolidated Mining Company will next month begin the erection of its central power plant at Minas Nuevas on the Parral & Durango Railroad, from which it will transmit power by wire to its three mines, the Terrenantes, Constancia and San Francisco; La Iguana Mine, owned by Messrs. Wendler, Blakesee and Pettit, is installing a large pumping plant; and the city of Parral itself is building and expanding rapidly. In the Jesus Maria District operations are being resumed on the San Roman Mine, and near Jesus Maria, in the Yepachi District at the Cinco de Abril, recently purchased by A. F. Nathan at $500,000 for the Kansas City, Mexico & Orient road, the new owners are getting the work well started. The same company is making arrangements for diamond drill work at Terrazas, and along the line of its road, while at its terminus of Minaca the Calera Mining Company is constructing a concentrating mill for the treatment of zinc-lead ores. It is understood that the Encinillas Mining Company, of London, has completed plans for the construction of a smelter at Santa Rosalia, south of Juarez, for its ores from the mines, 60 miles distant; that a smelter has been started at Camargo, Chihuahua; and that J. S. Edredge and F. S. Pearson, of the Dos Cabezas Mine, are surveying for a railroad from Gallego, on the Mexican Central, to Nueva Casas Grande, a distance of 60 miles.

In Coahuila, Sierra Mojada is soon to be in full blast after two years' idleness. Mazapil is awakening on the prospect of two railroads, one from Saltillo, passing Avalos and San Pedro, to Ocampo; the other from Hornos through Viesca, with a branch at Cedros by way of Mazapil to the main line and another branch to Bonaoja. Work is being pushed by the reorganized Coahuila Mining and Smelting Company, at Viesca, with Burt H. Whiteley as president. Jesus Trevino is opening the mines on "Sierra de Zuloaga" at San Pedro de Ocampo. At La Fronteriza work is being resumed. H. B. Phillips has, for his associates, paid $20,000 for three-fourths interest in the silver-lead properties of Creceucio Rodriguez, in the Bajan District.

The Monterey Iron and Steel Company receives iron ore from its own mines, the Anillo de Hierro and Piedra Iman, situated about three hours by rail from Monterey, and manganese ore from its properites at El Valle in Chilhuahua. The coal is from the company's mines at San Felipe, about 7 hours from Monterey by rail. The company contemplates erecting a $1,000,000 coking plant. John J. Moylan, the discoverer of some tracts of iron property in the State of Guerrero, 35 miles from the port of Acapulco, has interested Charles H. Foote, of the Illinois Steel Company, and he and associates are quietly raising capital for development.

Exchange of New York, though with very little selling, dropped during the week from 260 to 254⅜. The stock market has hardly recovered from the effects of the siestas of the previous week, but the few deals were at the following figures: Monterey Iron and Steel, $110; Dos Estrellas, $2,220; Cinco Senores, $195; Providencia de San Felipe, $140; Soledad, $375; Sorpresa, $325; and San Rafael y Anexas at $1,075.

London. April 11.

(From Our Special Correspondent.)

The development of the mineral resources of Ireland is receiving more attention now than has been the case for many years. A few weeks ago I mentioned the copper mine in Wicklow that Messrs. E. Henry Davies and Philip Argall are interested in. Of recent years also the bauxite deposits in Antrim have been extensively worked. There is at present an excellent exhibition of useful Irish minerals to be seen at the Imperial Institute. It has been organized by the Department of Agriculture under the direction of Mr. Horace Plunkett, a broad-minded gentleman, who is in close sympathy with the Irish peasantry. The long continued feud between landlord and tenant seems about to be settled, and in the more settled days to come, there is no doubt there will be more encouragement to capital for mining purposes. Copper pyrite and galena exist in some parts of the country, while gold mines were worked in early days in Wicklow, where ore still exists. The most valuable of the mineral resources, however, are the building stones. Marbles and granites are plentiful in the north and slates in the south. The exhibition of specimens is a most interesting one, and will be of great use to the country.

Sydney, N. S. W. March 17.

(From Our Special Correspondent.)

Queensland.—The option to purchase the £50,000 unissued debentures of the New Chillagoe Railway and Mines Company, Limited, has been exercised. The

smelting returns for the four weeks ending February 28 are 2,620 tons of Chillagoe ore, 649 tons Mungana, and 792 tons Mount Garnet; yielding 278 tons matte, containing 151 tons copper and 11,801 oz. silver. The cost of smelting was $4.18 per ton, which cost the management hopes soon to reduce to $3.80 per ton.

Mount Morgan treated 18,242 tons of ore in February, obtaining 10,248 oz. gold. At Charters Towers the batteries crushed 20,670 tons, securing 21,850 oz., which is an increase of 4,200 oz. over February, 1902. The cyanide works treated 24,500 tons, which yielded 13,360 oz. bullion. The total return is equal to 27,000 oz. smelted gold. The Queen Cross Reef and Victoria and Queen mines have given the largest yields yet obtained in one month; and the Brilliant Central yield shows a great improvement.

New South Wales.—The great talk of late is the improved prospects of the Barrier mines on account of the recent rise in lead. The Broken Hill mines have been preparing some time for this by developing underground, so they are ready to increase the output promptly. The Proprietary Company has already put on a night shift, and Block 10 will follow suit shortly. During the depression, ore treating plants have been completed, and experiments made on eliminating the zinc. The Delprat salt cake process is meeting all expectations. An official announcement is expected shortly. The Australian Metal Company has received seven or eight Ulbrich separators, capable of treating 1,000 tons weekly, which it is erecting at West Broken Hill, where are 70,000 or 80,000 tons of middlings and tailings to treat. The Mechernich plant on the Central is doing very good work, and the experimental plant at Block 10 is also doing well. The Broken Hill South Mine, despite the low price of lead and silver was able to pay a shilling dividend, or £10,000, for the half year ending December 31. The North Broken Hill scrip has been steadily rising, attributed to buying on account of those interested in the West Australian Smelting and Financial Corporation. It seems to be a necessity for large custom works out here to have a controlling voice in some producing mine.

The Silent Grove Mine, near Torrington, continues to yield satisfactory results. During February £1,000 worth of tin was won by crushing 14 tons from two small veins.

At Bear Hill, near Hillgrove, work has been going on for seven years to find the lost Butcher's reef. This is now believed to have been struck, the stone showing gold very freely. A crushing of 13½ tons just put through gave a return of 63 oz.

At Hargraves a most important development has taken place in Hogan's Mine, Tucker's Hill, very rich stone having been struck in the air shaft at a depth of 90 ft., proving the shoot to extend nearly 500 ft. Some ore ready for the battery is estimated to yield over 8 oz. to the ton.

A rich find is reported from Nerrigundah on the south coast. Lake & Egan obtained 70 oz. of gold from their claim at Lonsdale's Creek from a few dishes of rubble, in which one piece was almost solid gold, weighing 2 lbs.

The Mount Boppy output now averages about 2,000 oz. of gold monthly.

The Cobar Gold Mines, Limited, was idle from want of water nine months last year, but work was resumed early in December, and to the end of the year gold to the value of £15,285 was won.

There has been a new find of alluvial gold on Carwell Creek near Ilford on the Mudgee line. About 50 men are in the field. The width of the wash is from 8 to 10 ft., and the first shaft bottomed at 13 ft. The gold is fine and shotty, the largest speck found being worth $1. The highest prospect obtained was $5 to the dish.

Victoria.—The yield of gold for January was 39,231 fine oz. The returns from the Waanyarra rush show a slight falling off. Until rain falls the field cannot make much progress.

The Jubilee Gold Mining Company, Scarsdale, for the past half-year crushed 11,803 tons of ore, averaging $9.05 per ton. Mining and crushing cost $3.84, and cyaniding $0.685. From this £7,200, or $1 per share, was paid in dividends. Fifty per cent of the gold won went as dividends, or was expended in development and plant.

The Cassilis Gold Mining Company, which started the half year with a liability of £5,000, and also had to buy machinery at a cost of £656, has treated 5,281 tons for 4,690¾ oz., and has reduced the overdraft to £772.

The Belltopper Mine, near Lauriston, has crushed 172 tons for 512 oz. during the last six months. Since the company took over the property in March, 1902, it has crushed 402 tons for 964¾ oz., out of which it has paid a dividend of 25s. per share in addition to purchasing a complete winding plant and sinking a main shaft 100 ft.

At Lock's Find, near Egerton, a rich patch of gold was found, almost 20 oz. of gold being taken out of three dishes. One specimen weighed 5 oz. and another 2 oz. 7 dwt. The formation is over 50 ft. wide, with gold distributed throughout.

GENERAL MINING NEWS.

ARIZONA.

PINAL COUNTY.

(From Our Special Correspondent.)

Turning Point.—This mine, near the Pima County line, comprises 8 claims. Enough gold quartz is taken out to keep a 10-stamp mill busy.

CALIFORNIA.

AMADOR COUNTY.

Emmons.—The Cranmer Brothers have begun work on this claim at Pine Grove, which they hold under bond.

CALAVERAS COUNTY.

Gold Hill.—John C. Jens has been given permission by the California Debris Commission to erect a log-crib dam to work by hydraulic process this claim on the headwaters of the Calaveras River.

Lamphear.—Arrangements are being made by C. A. Westenberg and S. F. Allen, of San Francisco, to resume work on the Lamphear and Moser mines at Mokelumme Hill. Both mines have been idle for some time.

Rose Rock.—Work is underway at this mine at Murpheys. Jos. Heinsdorf is superintendent. The 5-stamp mill will start shortly.

ELDORADO COUNTY.

Independence.—Work has been resumed on this mine at Slate Mountain. The mine is owned by C. P. Croft, James O'Brien, George A. Schiff and J. F. Limpinsel.

Twin Brothers Mining Company.—Ore from the mine, near Salmon Falls, is to be crushed in a portable mill.

Whim.—At this mine, near Fairplay, G. S. Estey superintendent, a promising 2-ft. ledge has been cut in the shaft.

FRESNO COUNTY.

Copper King Mining Company.—This company, of Clovis, made a proposition for the appointment of a trustee by the creditors, the payment of all claims to be made within 2 years, half to be made within a year. The men who have filed miners' liens are also to be paid, but no definite time has been set, as the creditors must first decide on the company's proposition.

Valley View.—J. A. McClurg, of Fresno, has brought suit against John Terrill, George Ellis, J. C. Marsh and others to restrain them from working this mine at Sycamore Creek, and asks for an accounting for ores removed.

HUMBOLDT COUNTY.

Gold Beach Mining Company.—At this property, near Gold Bluff, there is some trouble, L. F. Puter having been appointed manager by one faction of the directors and H. D. Munson by the controlling stockholder, Senator Whitlock, of Connecticut, in which State the company was organized. The dredger to handle the black sand did not do the work satisfactorily, and final payment of $7,500 was refused the makers, who attached the property. The mine is now worked temporarily by sluices. The mine is at a lagoon near the ocean.

KERN COUNTY.

The niter fields, 50 miles from Johannesberg, are being prospected.

Hard Cash.—The first shipment of bullion has been made by Bentley & Bull from this mine at Randsburg.

Lady Belle.—This mine, at Kernville, has shut down its stamp mill, and will bring in water for power. A ditch is being dug.

Minnehaha.—Tungsten ore is reported found in this mine on Indian Creek, 18 miles from Caliente, S. B. Gregory is superintendent. The company has offices in Los Angeles.

Yarrayham Gold Mining Company.—This company is running a small prospect roller mill at its mines in Sageland District, west of Kelso Valley, an elevation of 7,900 ft. Mill tests give about $17.50 per ton.

MARIPOSA COUNTY.

Austin.—A pump is to be put in these mines at Whitlock, as water is increasing.

MONO COUNTY.

Del Monte.—This cyanide plant, at Bodie, has resumed operations under the supervision of James Barrett.

Syndicate.—The mill at this mine, at Bodie, J. F. Parr manager, will be running shortly.

NEVADA COUNTY.

Gold Tunnel.—At this mine, near Nevada City, John Eddie superintendent, a 10-stamp mill is to be erected and contract has been let for furnishing the lumber, etc.

Posey.—At this mine, on Willow Creek, near Nevada City, W. H. Bray superintendent, some fine specimen ore has recently been taken from the 400-ft. level.

Standard.—Mason & Curtis, owners of this mine at Dead Man's Flat, have started to prospect the property. A hoist and a pumping plant are to be put up at once. The mine was formerly owned by Michael Owens.

PLACER COUNTY.

Herman.—This mine, at Westville, which has been idle, has been sold to J. B. Hanna and 10 stamps are to be added to the mill.

Sacramento Mining and Dredging Company.—This new organization is to dredge the Fowler & Gallagher claim on the American River, near Colfax. It is thought that under the accumulation of tailings much gold still remains in the original gravel.

PLUMAS COUNTY.

Iron Bar.—J. B. Horne, of Chicago, is to put a cement mill on this gravel claim.

SACRAMENTO COUNTY.

Folsom Development Company.—This company, working near Folsom, has bonded certain lands from the Natoma Vineyard Company, upon which dredgers may be placed.

SAN BERNARDINO COUNTY.

The people who have been for some months trying to bore a well for water at Kramer, have quit after going down 900 ft., and will try at Jimgray Crossing, 8 miles east of Kramer.

Strikes of placer ground are being frequently made of late from Kleinfelder Canyon to Ivanpan, and the region is being thoroughly prospected.

SAN DIEGO COUNTY.

California Gold King Mining Company.—The Colorado Iron Works is suing this company at Picacho for the sum of $38,845.

Elevada.—Development is to be resumed on this mine at Banner by the Smoky City Mining Company. F. D. Jones is superintendent.

Glades Mining Company.—This company, at Pine Valley, is working the Spring and Oxide mines with 30 men. J. A. Wauchope is superintendent.

Oriflamme.—In this mine, at Banner, owned by L. N. Bailey and J. D. Moulton, good rock shows at several prospect openings.

SHASTA COUNTY.

Northern California Power Company.—This company will extend its electric line for 20 miles from the new plant on Cow Creek by way of the Afterthought Mine to the Bully Hill Mine at Delamar. Surveys are being made.

Texas.—This mine, at Old Diggings, has closed down for the present.

SISKIYOU COUNTY.

The miners at Rocky Gulch, Long Gulch and Canal Gulch, near Hawkinsville, have plenty of water for hydraulicking, and expect a long run.

Blue Gravel.—This mine, near Yreka, idle for some time, has been purchased by A. W. Williams, and will be worked on a large scale. Electric power may be applied to draining the mine.

Punch Creek.—This quartz mine, near Yreka, has been started up by George W. Grayson, of San Francisco, with David McCook as superintendent.

Tyrer.—Some rich ore is being taken out of this mine at Hornbrook, and the mill is busy.

TRINITY COUNTY.

Fairview Mining Company.—This company, at Minersville, Joseph Porter superintendent, has purchased four adjacent mining claims.

Headlight.—Eighteen men are at work in this quartz mine, near Trinity Center, Frank Fletcher superintendent. As soon as the ditch is repaired the Huntington mills will start crushing ore.

Layman.—At this quartz mine, near Hayfork, owned by J. B. Layman & Sons, a 3-ft. ledge of good ore is reported.

Maple Creek.—A cannon ball mill is steadily at work on ore from this mine, near Junction City, owned by D. C. Dedrick, James Anderson and Mrs. Maggie Bowie.

Shepardson & Kestler.—This hydraulic mine, at Hayfork, is equipped with an electric light plant for working at night.

Sykes Mining Company.—At this company's claim (Bloss & McClary), at Trinity Center, 2 giants are busy steadily and 24 men are at work in 2 shifts.

Van Ness.—At this mine, near Bragdon, Thomas Mayon manager, good ore is being taken out, and the mill is steadily running.

TULARE COUNTY.

Nelson Halleck.—These mines, at White River, have been purchased by New York men, and work will be carried on. These mines have been closed some years.

TUOLUMNE COUNTY.

Black Oak.—A hoist has been set up at this mine, near Soulsbyville, at the 1,300 level. The ore shoot on the 11th level is reported showing up well.

Golden Era.—At this mine, owned by the Conlin Brothers, ground has been prepared for a new hoist, which, with a pump and compressor, will soon be installed.

John Royal.—This mine, near Columbia, has been bonded to William L. Holmes, of Detroit, Mich., with water rights, etc. The bond also covers the Stockton quartz mine adjoining. The purchase price is reported at $50,000.

Prudhomme.—This mine, at Carters, has been unwatered. Sinking will start June 1.

Santa Ysabel.—The gallows frame at shaft No. 1 of this mine, at Stent, is being taken down, and will be erected at the new shaft. The new hoist will be run by electricity furnished by the power company. E. C. Loftus is superintendent. The new shaft is to be sunk to 1,500 ft.

COLORADO.

Northern Coal Company.—A committee of five, representing the United Mine Workers in the northern Colorado coal-fields, called upon the officials of the Northern Coal Company on April 28 in regard to the demands for an 8-hour day. With the exception of this company and a small operator, the demands have been granted by all the companies in the northern field. The committee was informed that the company's directors would not agree to an 8-hour day, although the decision was not unanimous. Should a strike result, about 1,800 men will go out.

GILPIN COUNTY.

(From Our Special Correspondent.)

Cashier Gold Mining and Reduction Company.—A shipment of first-class ores, b yleasers, from the Golden Wedge gave values of 17.83 oz. gold, 17.4 oz. silver and 16.35 per cent copper, or a net value of $377 per ton, while the second-class went 5.7 oz. gold, 9.6 oz. silver, and 6 per cent copper, or $117 net per ton. About 40 men are at work, and the company is reported to be paying regular dividends. B. L. Campbell, Central City, is superintendent.

Chase.—New York and Denver men have a lease and bond on this territory in Willis Gulch, which worked successfully on the tributing system. About 20 men are busy in the levels down to 400 ft. The ores as shipped to the sampling works give values of 4 to 12 oz. gold per ton. St. Louis, Mo., men are the owners.

Denver, Yankee Hill & Western Railroad.—This company purposes building a road from Central City through Russell Gulch along the divide to the Lincoln and Yankee mining sections, bordering on Clear Creek and Gilpin counties, the total length to be about 15 miles. The capital stock will be $500,000 in 10,000 sharesp at a par value of $50, and will be bonded for $500,000 in 5 per cent 20-year gold bonds. The newly elected officers are: President, J. C. McShane, Central City; vice-president, George R. Steuart, Alice; second vice-president, Herman Sturm, Denver; third vice-president, Dr. E. R. Fouts, Russell Gulch; secretary, B. E. Seymour, Central City; assistant secretary, W. J. Chamberlain, Denver; treasurer, George L. Torrey, Colorado Springs. The outlet for the new road is the Colorado & Southern Road from Central City. The railroad will prove a big thing for Alice and Yankee. Work is to start before June 1, and it is expected that the new road may be completed by the end of fall.

Four-Mile Gulch Tunnel Mining Company.—Chicago men, interested in a large group of claims in Enterprise District, have been developing them for several months. In the Wheeler and Bryan tunnels from 3 to 4 ft. of lead and silver ores are said to carry gold values ranging $50 to $65 per ton. The company will install a 16-h.p. gasoline hoist on the Democrat Claim, the shaft of which is down 100 ft. This shaft will be sunk to connect with the Bryan Tunnel 400 ft. below. John Brohl, Central City, is superintendent.

Orado Gold Mining Company.—This company, which recently took hold of the Carrie G and Hydrant property in Eureka District has opened up some nice ore in the 300 ft. west level, giving assay values of 9.2 oz. gold, 18.5 oz. silver and 16.5 per cent in copper, or $206 per ton. A number of leasers in the upper levels are taking out milling and smelting ores. A. Skeels, Central City, is in charge.

Powers Mining and Milling Company.—The company has ordered a new pump from Fairbanks, Morse & Co. A nice crevice of enargite or gray copper ore shows in the shaft bottom. Pennsylvanians are interested, with Burt Storey, Central City, in charge.

Town Topics Gold Mining Company.—Grading work goes on at the East Notaway Mine in Russell District for the new machinery and top buildings. The property is still being worked entirely on the subleasing system. The present depth is 666 ft. M. D. Draper, Central City, is in charge as superintendent.

Twolon Gold Mining Company.—Manager Stephen Hoskin, of Central City, has let a contract for moving the shaft buildings and machinery on the Unexpected Mine to the Two-forty property. Boston men are interested in a lease and bond.

Wilkes-Barre Mining and Milling Company.—Wilkes-Barre, Pa., men have purchased for $5,000 the Sick Dutchman and Blind Girl lodes; also a half interest in the Dark Horse lode, and have taken a lease and bond on the Baldwin and West Baldwin lodes in Russell District. A new shaft building and gasoline hoist have been placed on the Baldwin, the main shaft of the group, and sinking will be kept up for 200 ft. The group is credited with a production of $65,000, mostly from surface workings. J. F. Harrington, Central City, is superintendent.

LAKE COUNTY—LEADVILLE.

(From Our Special Correspondent.)

Leadville Ore Production.—The daily production has averaged 2,800 tons, the increase being due to increased shipments of low-grade iron.

Belgian-Frenchman Company.—Articles of incorporation just filed give capital stock at $1,000,000, with $1 shares. The officers are A. D. Dickinson, New York, president; J. L. Wright, L. R. Johnson and J. H. Stotesbury, all of Leadville, vice-president, secretary and manager, respectively. The property is on Iron Hill, and through the Belgian workings has in the past taken out much valuable ore.

Bismuth Ores.—Mr. Herman Poole, of New York, is here looking over the bismuth situation. There are some good deposits of this material in the Ballard and Big Six.

Breece Hill Cyanide Mill.—A very low-grade siliceous ore from the Ballard dump is being treated.

C. & S. Group.—This 70-ft. shaft on Prospect Mountain, where a large body of magnetic iron has been disclosed, will resume operations shortly.

Caribou Mining Company.—A large iron shoot is being opened, and iron shipments have increased to 100 tons a day.

Curran Group.—This Gold Belt proposition on Breece Hill is operated by lessees. A first shipment has just been made.

Ella Beeler.—This property, the Clear Grit and surrounding territory, operated for some years on a small scale by C. J. Moore, now of Cripple Creek, has been purchased by Mr. Moore, who is pushing work. A tunnel in 375 ft. is to be driven 75 ft., where it should cut the vein.

Fortune.—Owner McNeece has opened a gold ore deposit that has netted some big profits on recent shipments.

Iron Silver Mining Company.—The work of installing machinery on the new shaft is about completed. Shipments are 300 tons daily.

Matchless.—The suit against the Ransome Company et al. started by Mrs. Tabor has been transferred to Lake County. The suit is not regarded seriously.

Monarch Mining Company.—The Monarch Winnie and Lida shafts have opened great bodies of sulphides and oxides, and as soon as the Republic Smelter is completed will be able to ship heavily. The Monarch is shipping 75 tons daily, but can easily produce 300 to 400 tons.

New Zinc Mill.—The new plant being placed in readiness by D. B. Rowe and others near the Arkansas Valley Smelter will be one of the largest and best in the district. Magnetic separation will be used.

Peerless Maud.—The low-grade ores are handled by the Last Chance Mill, and a product averaging 60 per cent lead is made. A car-load every three days is the output.

Small Hopes Mining Company.—Much development is underway. Daily shipments have increased to 150 tons.

Yak Mining, Milling and Tunnel Company.—Having connected with the Ibex No. 4 shaft, further advance has stopped, and forces are now on development. Later the company intend to continue the bore into Breece Hill. It will permit the development of territory that could not otherwise be operated.

SAN JUAN COUNTY.

(From Our Special Correspondent.)

Esmeralda.—One of the greatest strikes in some years is reported from this mine in Minnie Gulch, near Silverton, in a cross-cut run from the 135-ft. shaft. The ore occurs in bunches, the values being gold principally, with some specimens of almost pure silver. The vein is 6 ft. wide, and a mill test has given $200 per ton. The property is owned by E. A. Nusbaum, of Chicago, who purchased it a year ago for $68,000. The resident manager is R. W. Hollis.

Highland Mary.—Thirty men are busy. Upraises are being run from the new tunnel to the old workings for ventilation.

Natalie-Occidental Mining and Milling Company.—This new company, a consolidation of the Natalie and Occidental companies, has the following directors: Horace L. Hotchkiss, Francis E. Pinto, Jr., and George W. White, of New York City, and T. J. Hurley, of Silverton. The company is capitalized at $3,000,000. A new mill is to be erected during the present season.

Ouray Mining Company.—This new company, composed of Des Moines, Ia., parties has acquired and is developing 24 claims in upper Poughkeepsie Gulch.

Royal Mining Company.—Operations have been resumed, and the tunnel is being pushed toward the Mazeppa vein, 300 ft. distant.

Ruby Basin Tunnel.—The company has abrogated all contracts, and is now pushing the tunnel by day work toward the Tornado vein, about 300 ft. ahead.

San Juan Smelting and Refining Company.—This new company is a consolidation of the Kendrick-Gelder Smelting Company, the Oliver Reduction Company and the Paradox Copper-Gold Mining Company. The capital is $3,000,000. Eastern men have agreed to take $300,000 worth of stock, the money to be used in purchasing custom ores for the smelter at Silverton to build a tramway from the Henrietta Mine to the railroad and to build a 200-ton mill. The property has 300,000 tons of ore blocked out, and is capable of shipping 500 tons per day.

Scranton City.—This tunnel is now in 800 ft., and will be pushed forward until all the Silver Lake properties are opened at a depth of from 1,500 to 2,000 ft.

Silver Lake Mines.—S. I. Hallet has resigned as general manager, and will take charge in a similar capacity of important properties in Old Mexico for the Guggenheims. He will be succeeded at Silverton by Rowland Cox, of Ouray.

Tobasco Gold Mining and Milling Company.—Operations will be resumed May 1. New machinery will be added to the mill before shipments are regular.

Tom Turner Group.—This group, consisting of the Tom Turner, Emma and Florence lodes, and the Florence mill site, was recently sold to George W. Crawford, of New York, and Henry J. Mayham, of Denver, who afterward transferred it to the Gold Queen Mines Company, incorporated with a capital of $1,800,000. The directors are as follows: George W. Crawford, W. E. Bridgman, Harvey Riddle, H. J. Mayham, J. Treadwell Richards and William P. Mallon.

TELLER COUNTY—CRIPPLE CREEK.

(From Our Special Correspondent.)

Cripple Creek Drainage Tunnel.—Work is still progressing in spite of the fact that an injunction has been applied for by the Grace Arthur Extention. At present the tunnel is worked from five headings, and good progress made. The El Paso Company has the contract to construct the tunnel.

Stratton Cripple Creek Mining and Development Company.—The announcement has been made that leases will be granted next week. There are a large number of applications for most of the ground, especially that on Bull Hill. It is understood that the royalties will be graded according to desirabliity, ground on Bull Hill being the highest, and on Globe Hill the lowest.

Lincoln.—A strike of rich ore is reported in this property, near the town of Gillett, but so far has not been verified. Some years ago a little pay ore was shipped, but no ore in paying quantities has been found since.

Princess Alice Consolidated Gold Mining Company.—This company has secured control of the Bonnie Nell Consolidated Gold Mining Company. The figures given were about $90,000. The property is mostly situated on Raven Hill, and consists of about 30 acres. It is also understood that the Princess Alice Company has made arrangements to buy the Abe Lincoln claim north of the Jo Dandy claim, on Raven Hill.

Stratton's Independence, Limited.—It is understood that the development work on the 1,400-ft. level has stopped on account of water, and it is also understood that an increased boiler plant, costing about $10,000, is to be put in. The property is producing considerable ore, reported to run about $20 per ten.

United States Geological Survey of Cripple Creek.—Funds are being raised by private subscription to have the survey of this district by the United States eGological Survey brought up to date. In 1894 Messrs. Whitman Cross and R. A. F. Penrose made a report, and the maps were published in 1895. The amount of money needed is put at $7,000, of which $3,500 must be raised by subscription. So far the county commissioners have refused to appropriate any money for the purpose, and a private subscription has been started, about $700 having been donated. The Cripple Creek Chamber of Commerce is expected to take action.

IDAHO.

BLAINE COUNTY.

Point Lookout.—A good strike of gold ore is reported 30 ft. below the 300-ft. level, in this mine, at Bullion. M. H. Lipman is superintendent.

IDAHO COUNTY.

Hogan Brothers.—This mine, at Dixie, has a 20-stamp mill. The ore averages about $5 per ton.

Northern Star Mining Company.—This company, owning mines at Dixie, has completed a stamp mill and concentrating works. The property is owned by Spokane and Indianapolis stockholders.

SHOSHONE COUNTY.

Fidelity.—C. C. Garrett, manager of these placers, has one pipe running and expects to be able to start the other in a week or 10 days. The company has 12 men employed.

New Jersey Mining Company.—This company, operating 2 miles above Wallace, has filed a notice of the increase of its capitalization from $10,000 to $2,000,000, and the par value of the shares from 10c. to $1. The company is rapidly completing improvements. About 200 ft. of the long flume are completed and excavation for the mill has started.

Vaughn & Holmes.—The giants on these claims, 3 miles north of Pierce, have started. The claims have been worked for 20 years.

Washington Water Power Company.—This company has let the contract to Fred Phair, of Spokane, Wash., for the erection of 7 brick buildings in the Coeur d'Alenes, to be used as sub-stations for the transmission of electrical power to the mines, supplied from the Spokane plant. Work already has started, and will be pushed rapidly. Each building will be 18 ft. square and about 30 ft. high. One building will be at Burke, for the Tiger & Poorman Mine, and the Hecla Mine; one at Mace, for the Standard Mine; one at the Mammoth Mine; one at Wardner, for the Last Chance Mine; one at Kellogg, for the Bunker Hill & Sullivan Mine; one about one mile below Kellogg, at Sweeny, for the Empire State mines; and one a mile above the latter point, on the railroad spur, for the mines of the Coeur d'Alene Development Company. About one-third of the 101 miles of pole line for the transmission wires of the company have been put up. The workmen have had much difficulty from bad roads.

Yolande Mining Company.—This company, of which Dr. I. L. Magee, of Wallace, is one of the principal owners, and in which Larson & Greenough were interested, has deeded all of its rights to Larson & Greenough, of the Morning Mine, for $20,000. The entire Yolande property is then turned over to the Hunter Company, and the latter company gives Larson & Greenough an $86,000 mortgage on its property. The Yolande property consists of three claims. The $86,000 mortgage held by Larson & Greenough over the Hunter Company is made payable in three different payments, the last January 15, 1906. The Hunter property consists of 11 full claims, 4 mill sites and 2 water rights.

ILLINOIS.

JO DAVIESS COUNTY.

Grant Reduction Works.—The new mill is at work.

Elgin Company.—This company, which has leased the old Flat Sheet diggings near Galena, is cleaning up and cribbing the principal shaft under the supervision of Henry Wilhelmi.

MACOUPIN COUNTY.

Burlington Coal and Coke Company.—This company has secured 3,166 acres of land 2½ miles southwest of Virden, and will sink a large mine there. The new shaft will have a capacity of 2,000 tons a day. The companion mine will be the same size, and the shafts will be equipped with the latest machinery. A spur will be built from the Jacksonville & St. Louis Railroad to the mine.

Little Corporal.—This mine at West Diggings will soon have a large mill.

SANGAMON COUNTY.

(From Our Special Correspondent.)

Jefferson Coal Company.—This company, of which James W. Jefferson, of Springfield, is president, operates a small mine about 2 miles southeast of Springfield, on a spur of the Baltimore & Ohio Southwestern Railway. It has purchased 700 acres of coal right extending from present holdings east to a point on the Illinois Central Railway, and will open a large mine.

Peabody Coal Company.—This company, of Chicago, Francis Peabody president, has bought the coal under the 1,100-acre Carpenter farm in Clear Lake Township, just north of the Sangamon River, and along the line of the Chicago & Alton, and Chicago, Peoria & St. Louis railways. It expects to sink a shaft and open a mine at once.

Tuxhom Coal Company.—This company, recently organized at Springfield, is sinking a shaft on the Cincinnati, Hamilton & Dayton Railway, about 3 miles southeast of Springfield. Edward D. Reys, Samuel D. Scholes and Robert Solomon are interested. Mr. Solomon was formerly a member of the firm of Solomon & Moore, who operated the Black Diamond Mine, now the property of the Springfield Coal Mining Company. The Tuxhom Coal Company expects to be ready to ship coal early in the fall.

INDIANA.

SULLIVAN COUNTY.

(From Our Special Correspondent.)

Coal Miners' Strikes.—About 100 miners are on a strike at the Gilmore coal mine on account of a contention over loading broken coal, and 100 miners have quit work at the Glendorf mines because of firing shots. The operators have been shooting at the noon hour, and the miners ask that shots be fired at quitting time. One hundred miners at Green Hill Mine are still out, pending a settlement of grievances of the machine men.

MICHIGAN.

COPPER—HOUGHTON COUNTY.

(From Our Special Correspondent.)

Osceola Consolidated.—The trammers at the North Kearsarge branch, who struck for higher wages, have accepted a settlement offered by the company. Production from the two shafts has been resumed.

Trimountain.—This company has purchased the steel shaft and rock house, 44 by 64 ft., at No. 2 shaft of the Arcadian Mine. The Wisconsin Bridge and Iron Company, of Milwaukee, Wis., has a gang of men taking it down. The structure will be erected at No. 4 shaft of the Trimountain. The rock house is fitted with a duplicate set of jaw crushers, with openings 17 by 24 ins. and 13 by 20 ins., and a steam hammer for handling masses, all being driven by a 10 by 24 Corliss engine.

Wolverine.—One hundred men are out on a strike and work has been suspended. The trammers demand an increase in wages from $56 to $58 per month. The output of Michigan will be smaller than usual as rock shipments have been discontinued.

COPPER—KEWEENAW COUNTY.

(From Our Special Correspondent.)

Allouez.—A boiler, derrick, engine, etc., have been moved to the site of the new shaft. Sinking will be begun shortly to open the Kearsarge lode, which will be encountered at a depth of about 1,000 ft.

Cliff.—The old machinery at this mine, one of the pioneer properties in the lake district, has been sold to second-hand dealers. A contract has been awarded Hall Brothers, who will remove it to Houghton.

COPPER—ONTONAGON COUNTY.

(From Our Special Correspondent.)

Michigan.—This company has leased 1 head at the Mass Consolidated stamp mill, at Keweenaw Bay, for 6 months. The Mineral Range Railroad will extend its tracks from Rockland, 2½ miles distant, to connect with the mine. Production will likely commence about June 15. A 40-drill air compressor has been ordered from the Ingersoll-Sergeant Drill Company, of New York.

IRON—MENOMINEE RANGE.

Dunn.—This Crystal Falls mine is now down 400 ft., with its new shaft, but has another 400 ft. to go before reaching the ore. At 600 ft. it will tap the flooded workings and drain them in order to permit exploring. Some earth under the old pocket is being stripped, which will allow mining there this season.

Hemlock River Mining Company.—This company (Pickands, Mather & Co. has stopped exploration on the Levin property at Amasa, Mich., where three drills have been working all winter, and moved the drills to Stambaugh, where the company has some explorations under way.

Oliver Mining Company.—A contract for the construction of a new steel flume at the works at Quinnesec Falls has been awarded to the American Bridge Company. The work is expected to commence in June. An immense concrete dam across the Menominee River at the hydraulic plant will also be built by the Oliver Company, while work on the flume is in progress. The water-wheels will also be deepened and a large electrical generating plant installed. The entire plant at the hydraulic works is, in fact, to be rebuilt at a cost of about $500,000.

IRON—MARQUETTE RANGE.

Hunkeford.—Eastern men have secured an option on this mine at Humboldt, and are preparing to work it. A diamond drill will be used, and a new shaft sunk. The Hunkeford has been closed since the early 60's, when it was worked as an open pit. The ore is of low grade.

MISSOURI.

JASPER COUNTY.

(From Our Special Correspondent.)

American Zinc, Lead and Smelting Company.—Lessees on this company's property in the Midway group, between Joplin and Webb City, are making some new developments. The Bash-Scogin Mining Company is removing and rebuilding an old concentrating mill. Glenn, Jenkins & Co. have 30 ft. of ore in a new drill strike. The Terra Cotta Company has completed a mill, and is erecting trams from two shafts. Mattis Brothers have leased the Sassafras property and are unwatering it. C. T. Orr is drilling a lease north of the California. The Thames Mining Company is sinking both its shafts.

Joplin Consolidated Mining Company.—A dividend of 5 per cent has been declared, and the following new officers elected: J. B. Guinn, president; John F. Wise, vice-president; C. W. Glover, secretary and treasurer. The company decided to lease its 160-acre tract in 10-acre lots.

West Hollow Mining Company.—A new lead discovery on this tract that has produced lead for 40 years, was made recently at 45 ft.

ST. FRANCOIS COUNTY.

(From Our Special Correspondent.)

Buckeye.—The new mill at Fredericktown has started up, adding a new producer. Its present capacity is about 200 tons per 24 hours.

St. Joe Lead Company.—This company has increased the wages of its men to the scale of the newer Flat River District. It has hitherto insisted on a differential, as its mines are shallow and dry. After May 1 labor will be put on an 8-hour basis, both on the surface and underground. To still further increase its production, the erection of a new mill at its Hoffman shaft is under consideration, while the smelting plant at Herculaneum is again being enlarged.

Pittsburg parties are taking several options and have started drilling near Bonne Terre.

MONTANA.

CARBON COUNTY.

Bear Tooth Coal Company.—This company has been formed at Red Ledge by John W. Chapman, D. C. O. Shea, William Harkin, Roger J. Fleming and F. H. Alden. The company has secured a lease of all the coal underlying the Hymer addition to Red Lodge, under a royalty. The officers are: John E. Chapman, president; D. C. O. Shea, secretary-treasurer and manager.

GALLATIN COUNTY.

Washoe Company.—A good coal seam, 12 ft. thick, is reported found at this company's coal mine at Storrs. The washery is nearly completed, and work has started on the coke ovens.

GRANITE COUNTY.

Moose Lake Mining Company.—This concern, capitalized at $200,000, in $1 shares, has as incorporators T. J. Cadle and W. A. Bower, of Anaconda, and R. E. Taylor, of Butte. The officers are: W. A. Bower, president; J. T. Cadle, vice-president; F. W. Peckover, secretary. The principal office is to be in Anaconda, but the property to be worked is near Moose Lake, and includes the Dandy and Daisy quartz claims and the Last Chance placer claim. There is a Tremaine mill on the ground. Among the other properties owned by the company is the old Abe Lincoln property. The Moose Lake region is 50 miles from Anaconda, and is a new district, mostly undeveloped. With the commencement of work by the Moose Lake Company, attention will likely be attracted to the district by other investors.

PARK COUNTY.

B. & G.—R. A. Bell, of Helena, has closed a deal with Philadelphia men for an interest in these mines, 20 miles from Helena, and adjoining the Bell Mine. The B. & G. has a shaft 250 ft. deep, with 1,000 ft. of tunnel, and shows a lead of ore from 20 to 30 ft. wide in the lower workings.

Kimberley-Montana Mining Company.—This company will immediately start the Revenue 40-stamp mill at Jardine, and a large force of men will be put to work in the mines. The cyanide plant being built is nearly ready.

SILVERBOW COUNTY.

Emma.—After spending $185,000 in this development, the company in charge of this property at Butte, has decided to suspend operations for the present. The vein at the depth of 800 ft. is reported 300 ft. wide.

Pittsburg & Montana Copper Mining Company.—Ground has been broken for the smelter that is to be built in the East Butte addition to Butte by this company. The site for the smelter and other buildings will be 1,200 ft. square, and adjoins the McQueen addition, on which are situated the mining shafts known as Farrel No. 2 and Farrel No. 3. Shaft No. 2 is now operated. Machinery is being placed in position to operate shaft No. 3. The new smelter is expected to be in operation the latter part of the year, and to give employment to about 700 men. William Kirkpatrick is the resident manager of the company, and Mr. Rothwell is the metallurgist.

NEVADA.

NYE COUNTY.

(From Our Special Correspondent.)

There is quite a "rush' to a new district about 40 miles from Tonopah, Nev. Some of the ore is similar to that of Tonopah, and it assays quite high. It is 12 miles south of Pactolus.

NEW MEXICO.

GRANT COUNTY.

Johnnie Bull Copper Mining Company.—The stockholders in this company of Stein's Pass, recently met in New York City to frame a plan to investigate what has become of the mine and of the money invested in it in April and May, 1899, when 35,000 shares of stock were sold at 50c. a share. William H. Henry, manager and representative of the original owners of the property; Gen. C. C. Dodge and Alice M. Henry. Thomas A. Ennis, of Ennis & Stoppani, of New York City, and Alexander Lassen took the property and agreed to deliver a deed for $300,000 as soon as a corporation was formed and accept $299,000 of stock as the purchase price for the mine. Thomas A. Ennis, promoter and president, gave an obligation for $299,000, that was afterward dishonored and is now on file as a vendor's lien against the mine. Mr. Henry says that only $7,700 of the $11,145 received for stock issued was used for the development of the mine, which shut down in February, 1900.

Wildcat.—This group of mines, near Santa Rita, has been bonded and leased by St. Louis, Mo., men. The property contains low-grade copper ore. The new owners will put about 40 men to work.

TAOS COUNTY.

Fraser Mountain Copper Company.—This company is to have its smelter at Twining busy in two weeks. It will treat 220 tons of ore a day. The company is at present treating 75 tons of ore a day at its concentrator.

San Cristoval Mining Company.—This Company of Twining, has decided to build a cyanide mill.

NEW YORK.

St. Lawrence Steel and Iron Company.—This company, of Syracuse, is capitalized at $50,000. The directors are Orphia L. Buckley, Cornelius E. O'Connor, William F. Hodge, Francis B. Cannon and William O. Hintermeister. The company proposes to develop the iron mines at Keenes, on the boundary line between Jefferson and St. Lawrence counties. The company may build a blast-furnace near the mines, which are on the Rome, Watertown & Ogdensburg branch of the New York Central.

OHIO.

Mutual Oil Company.—This company was organized at Canton recently, with a capital stock of $1,000,000, by the election of the following directors: Louis A. Loichot, R. S. Lenhart, Thomas F. Turner, W. L. Stolzenbach, J. F. Dougherty, Canton; Charles F. Shell, Cincinnati; I. R. Longsworth, John W. Robey and F. F. Leland, Lima. The officers are: President, Louis A. Loichot; vice-president, R. S. Lenhart; secretary and general manager, John W. Robey; treasurer, W. L. Stolzenbach. The company has purchased nearly 900 acres of oil-producing land in Wood and Van Wert counties, and has 44 wells in operation.

OREGON.

BAKER COUNTY.

(From Our Special Correspondent.)

Gold Pan.—A 25-h.p. gasoline hoist has been ordered.

Golconda.—The management has begun development of the Wide West ground on the tunnel level, which will give a depth of 500 ft.

North Pole.—The finished mill, with 30 stamps, 9 percolating tanks and 6 agitating tanks, is at work.

Snow Creek.—The management is preparing plans for a 10-stamp mill. The Zelda tunnel is said to show the ore shoot over 325 ft. long, and more than 9 ft. wide.

Victor.—This group of prospects, near Baker City, has been purchased by A. G. Hanauer, of Spokane, and a small force put to work developing it.

DOUGLAS COUNTY.

Red Bean.—This mine, at Hogem Gulch, near Galesville, owned by Messrs. Riggs, Flamm and Evans, of Grants Pass, has been sold to T .B. Scott, of Chicago, for a reported price of $30,000. Development work is to be pushed.

GRANT COUNTY.

Dixie Meadows Gold Mining and Milling Company.—This company, of Prairie City, has placed an order with the Mine and Smelter Supply Company, of Denver, for a 10-stamp mill and concentrator. The mill is to be in operation in July.

(From Our Special Correspondent.)

Belcher Group.—The tunnel being driven on the Golden Gate claim is reported to have opened a fourth shoot of ore 1,500 ft. from the face.

Bull of the Woods.—The shaft is producing ore, which is handled in the Badger concentrator.

Humboldt.—The management of this property, owned by the Fortune Mining and Smelting Company, is preparing to install a 25-h.p. gasoline hoist.

Independence.—G. F. Berbridge, of Spokane, has bonded this group of prospects in the Granite District, and will start development immediately.

JOSEPHINE COUNTY.

Blue Ledge.—Patrick Clark and C. B. Kingsbury have bonded this group of 16 copper and gold claims, and have also bonded 11 adjoining claims. The mines are about 30 miles from the railroad. It will be necessary to erect a smelter at or near the mines. Experts representing W. A. Clark, F. A. Heinze and Larson & Greenough examined the claims and reported favorably upon the showing, but the group was located about three years ago by Cooper, Adams & McVeigh. There has only been about 200 ft. of development work done on the property.

PENNSYLVANIA.

ANTHRACITE COAL.

James E. Roderick, as chief of the Bureau of Mines and Mining, has sent out an abstract of his annual report for the year ending December 31, 1902, as follows:

Districts:	Tons.	Days.	Employes.	Fatal acc'ts.	Non-fatal acc'ts.
First	4,932,924	115	18,490	29	60
Second	6,052,725	108	18,229	24	109
Third	5,077,167	104	18,197	48	115
Fourth	6,099,420	108	24,764	52	134
Fifth	3,190,765	120	14,364	26	35
Sixth	4,366,827	118	20,858	52	66
Seventh	3,968,339	121	19,856	46	58
Eighth	3,223,387	136	13,383	23	64
Total	36,911,554	116	148,141	300	641

The report also gives much other interesting and valuable information, as: Kegs of powder used, 845,147; pounds of dynamite, 2,130,965; number of horses and mules, 16,139; horse-power of boilers, 354,237; number of pumps, 837. The 837 pumps that are in use bring to the surface every minute 431,941 gal. of water, but when worked up to their full capacity the output would be 612,906.

Philadelphia & Reading Coal and Iron Company.—This company recently started work on a new combined coal and water shaft at its Maple Hill Colliery, near Shenandoah. The shaft has been sunk 300 ft., but when completed will have a depth of 1,000 ft. There will be 6 hoistways, 2 for coal and 4 for water. The colliery affords work to 1,400 persons at present, but when completed will give work to several hundred more, making it the largest colliery owned by the company.

BITUMINOUS COAL.

Henry W. Oliver is said to have purchased from Lloyd, Cassatt & Co., of Philadelphia, 1,000 acres of gas coal land located near Finleyville. The property purchased adjoins a tract of 4,000 acres owned by Mr. Oliver. The sale was for cash and the price is said to have been about $200 an acre. The price is about the highest yet paid for Pittsburg vein coal in that neighborhood.

What is called the largest coal deal ever closed in Washington County has just been consummated at Washington, when 7,000 acres of the Pittsburg vein of coal lying in West Bethel and Amwell townships, known as the Lone Pine block, passed from the hands of farmers to Pittsburg, New York, Cleveland and Philadelphia capitalists. The average price paid for the territory was $100 an acre.

Highland Coal Mining Company.—This company is now shipping coal from its new mine at North Point. The company will also put in another drift near Findleyville, in the Broad Top region, and from these two openings will ship from 300 to 500 tons a day during the latter part of this year.

Mansfield Coal and Coke Company.—John A. Bell, a director of the Pittsburg Coal Company, recently bought the control of this company for a reported price of about $200 per share. The company was formed before the Civil War, and has been very successful, paying all told something like $1,000,000 on its capitalization of 50,000 shares of $5 each. The company was one of the first to ship up the lakes.

West Penn Coal Company.—This company is opening a mine on the West Penn Railroad, west of Apollo. The coal will be mined with punching machines, conveyed to the tipple by machinery and run over a patent Mitchell dump. H. E. Sweet has charge.

TENNESSEE.

Chicago-Tennessee Coal and Coke Company.—The new coke ovens at Waldensia are now in full operation. This company is shipping about 500 tons of coal daily.

HICKMAN COUNTY.

Middle Tennessee Coal and Iron Company.—This company's property has been sold to a syndicate of Nashville men at $2 to $3 an acre. It consists of 30,000 acres of mineral lands, located in the Cumberland Mountains, and has been involved in more or less litigation. The company purchased it in 1889.

Sewanee Coal and Coke Company.—This company is planning extensive improvements in its property at Nunnley Ridge. Additional coke ovens will be built and more machinery installed in the mines.

MAURY COUNTY.

Phosphate mining has begun on Allen Harlan's farm, near Columbia, and the Virginia-Carolina Chemical Company is building a railroad there from Ashwood, a distance of 5 miles.

SHELBY COUNTY.

Sewanee Coal and Coke Company.—This company is to push the erection of a large number of coke ovens, and the installation of new machinery at its new mines on Nunley Ridge, to which the Nashville, Chattanooga & St. Louis Railroad is now building a branch line 8 miles in length. The output of this mine will be about 50 tons of coal at first, but will be rapidly increased. The officers are: F. B. Martin, president; C. Heidenberg, vice-president, and Earle Martin, secretary. The offices are at Tullahoma.

UTAH.

(From Our Special Correspondent.)

Ore and Bullion Settlements.—The banks of Salt Lake City report the settlement on ores and bullion for the week ending April 24 as: Bullion, $182,100; gold, silver, lead and copper ores, $194,071, and gold bars, $33,900; making a total of $410,071.

Bingham Consolidated.—During the week ending April 24 the usual shipment of 3 cars, or 179,300 lbs. of copper bullion, was made East.

Highland Boy Smelter.—The usual shipment of 4 cars, or 240,000 lbs. of copper bullion, was made East to the refiners during the week ending April 24.

United States Smelter.—The shipment East of copper bllion for the week ending April 24 amounted to 241,969 lbs.

BEAVER COUNTY.

(From Our Special Correspondent.)

Frisco Shipment.—For the week ending April 24 the only shipment is from the Horn Silver, 3 cars of high-grade ore.

Wild Bill.—This mine at Milford, in the week ending April 24, shipped a car of smelting grade ore. Examination of the property will probably be finished by May 1, when the fate of the deal now on with Columbus, O., parties will be known.

IRON COUNTY.

Utah Iron Company.—This company, of Salt Lake, has been incorporated with a capital of $1,000,000, with the following officers: Thomas Marioneaux, president; Edward Horne, treasurer; Fred T. McGurrin, secretary. They, with Joseph Hause and James T. Hammond, constitute the board of djrectors. The company owns a number of iron claims in the Iron Springs District.

JUAB COUNTY.

(From Our Special Correspondent.)

Tintic Shipments.—For the week ending April 24 the samplers report the following receipts: Uncle Sam, 2 cars; Star Consolidated, 2 cars; Mammoth, 13 cars; Gemini, 18 cars; Eagle & Blue Bell, 6 cars; Lower Mammoth, 1 car; Grand Central, 36 cars; Yankee Consolidated, 12 cars; Victor, 3 cars.

Eagle & Blue Bell.—Upon the payment of $10,000 the control of this property passed to Eastern men, who, under the management of Duncan McVichie, will push development.

Tetro.—It is given out that this Tintic property is soon to resume shipments.

White Cloud.—At this mine, south of Diamond, ore has been cut which is said to show 60 per cent lead, 15 oz. silver, and $6 in gold.

SALT LAKE COUNTY.

(From Our Special Correspondent.)

Bingham Shipments.—For the week ending April 24 the shipments as reported by the samplers are as follows: Dalton & Lark, 3 cars; Erie, 1 car; Neptune, 11 cars.

American Smelting and Refining Company.—It is stated that Manager Whiteley has placed one order for a large engine for the new smelter.

Yampa Smelter.—It is understood the work on this new plant for the Tintic Development Company will begin at once. G. H. Robinson has arrived from the East, and will have charge.

SUMMIT COUNTY.

(From Our Special Correspondent.)

Park City Shipments.—For the week ending April 24 the Mackintosh Sampler reports the following: Daly West, 3,227,780 lbs.

Acondale.—This property will begin at once sinking a 400-ft. shaft between the Naildriver and the Liberty Mining Company's properties.

TOOELE COUNTY.

(*From Our Special Correspondent.*)

Stockton Shipments.—For the week ending April 23 the Ophir Hill Mine, of Ophir Canyon, sent in 16 cars of concentrates, and the Stockton Mine, of Stockton camp, 1 car of ore.

Cave Springs.—It is stated these Deep Creek properties are to be revived, and that Eastern men have a bond. From the mill the first gold bar was sent from the district. It is understood the price asked is $150,000.

WASHINGTON.

FERRY COUNTY.

Republic Reduction Company.—The electro-chemical mill is to be torn down. Part of the machinery may be used on the Blue Horse group of claims, about 2 miles south of the California Mine, and now under bond to J. F. Lansing.

(*From Our Special Correspondent.*)

Belcher Mining Company.—What is known as the "red" tunnel has been extended about 200 ft., cutting what is said to be the largest body of sulphide ore yet found south of Rossland, the ore running from a few dollars to $52 per ton in gold, silver and copper. The underlying formation is said to carry arsenical iron ore in isolated bodies.

Lone Pine-Surprise.—The Lone Pine workings at Republic employ 23 miners. Ore is shipped regularly, but no definite information can be had at the mines.

Lucile Dreyfus.—The cross-cut on the 250-ft. level is reported to have found the vein 45 ft. wide, of which 13 ft. is shipping ore, contained in 5 different pay streaks of 2 to 3 ft.

North San Poil.—The lessee of this mine at Republic has shipped 200 tons of ore to the Crofton Smelter, and has a considerable quantity ready to ship.

Park & Central.—Work has been resumed. The tunnel has cut several stringers of high-grade ore, the last being 15 ins. wide.

Quilp.—An upraise, to be finished in two weeks, is under way from the No. 5 level to connect in ore with the No. 4 level of this Republic mine. No information is obtainable from the management.

Summit.—This claim, near Republic, east of and adjoining the Gold Cord, has a shaft down 109 ft. The vein is 5 to 6 ft. wide, 4 ft. carrying values from $30 to $80 per ton in gold, silver, copper and lead, the copper predominating. At the bottom a cross-cut goes through 5 ft. of quartzite, which runs from $60 to $80 per ton, with 1 ft. of sulphide ore, averaging $60 per ton. Drifts are being run on the vein. H. R. Alexander is superintendent.

KITTITAS COUNTY.

Cedar Valley Gold Mining Company.—This Spokane company has purchased the Cedar Valley placer mines, on Swauk Creek, and is starting work on the property, which consists of 100 acres of placer land, 85 acres of which have never been touched. One giant is being installed on the property, and two more will soon be working. The stock is mostly owned in Spokane and Iowa.

WEST VIRGINIA.

CABELL COUNTY.

T. N. Barnsdall, of Pittsburg, Pa., recently closed a deal for 22,000 acres of promising coal lands lying in the Guyandotte Valley, which is to be developed at once. The coal will be shipped via the Guyandotte Valley Railroad.

FAYETTE COUNTY.

(*From Our Special Correspondent.*)

C. C. Sharp, of Boomer, W. Va., and J. F. Stone, of Columbus, O., respectively general superintendent and secretary-treasurer of the Boomer Coal and Coke Company, which recently sold out to M. A. Hanna & Co., of Cleveland, O., have recently bought 14,000 acres of coal land on Twenty-Mile River, a tributary of Gauley River, also 7,000 acres 4 miles up Gauley River from Belva. Both properties can be reached by branches from either the Chesapeake & Ohio or Kanawha & Michigan Railway.

The former of the above mentioned properties was opened some years ago by the Morris Coal Company, of Ohio, but they ran into a big fault and abandoned it, and about three years ago W. P. Rend & Co., of Chicago, tried it, and also abandoned it.

WYOMING.

LARAMIE COUNTY.

Belgo—American Oil Syndicate.—This company has its well in the Salt Creek District down 1,200 ft. Recently a gas blow-out wrecked the derrick.

SHERIDAN COUNTY.

Sheridan Coal Company.—This company's mines at Dietz, 4 miles west of Sheridan, are shut down as the result of a strike following the formation of a miners' union. The company last fall put a new Phillips tipple and new screen, and instituted a new system of payment for the miners according to the tonnage, instead of paying by the car.

FOREIGN MINING NEWS

AFRICA.

NATAL.

The Mines Department reports the production of coal in February at 50,040 tons, against 48,502 tons in February, 1902; an increase of 1,538 tons. Coal exported for the month was 20 tons; while 17,497 tons were sold to steamers in the port of Durban.

RHODESIA.

The total yield of gold reported in March was 19,626 oz. bullion. The total for the three months ending March 31 was 52,961 oz. bullion, against 46,050 oz. in the corresponding period in 1902; an increase of 6,911 oz., or 15 per cent. The bullion reported this year was equal to 47,135 oz. fine gold, or $974,280.

TRANSVAAL.

The total gold output reported for March was 217,465 oz. fine, of which 208,456 oz. came from the Witwatersrand and 9,009 oz. from the outside districts. For the three months ending March 31 the total yield, in fine gold, was: Witwatersrand, 589,367 oz.; other districts, 23,890 oz.; total, 613,257 oz.—or $12,676,022—against 255,873 oz. for the corresponding period last year.

ASIA.

INDIA—MYSORE.

Kolar Gold-field.—The output of all the mines in March is reported at 48,327 oz. bullion, being 2,059 oz. more than in February. For the three months ending March 31 the total was 142,675 oz., against 123,240 oz. in the corresponding period in 1902; an increase of 19,435 oz., or 15.8 per cent. The total this year was equal to 128,408 oz. fine gold, or $2,654,193.

AUSTRALIA.

QUEENSLAND.

Mount Morgan Gold Mining Company.—This company reports for March a total of 19,515 tons of ore treated by chlorination; the yield being 11,259 oz. gold, an average of 0.58 oz. per ton.

CANADA.

ALBERTA.

French Coal Mines' Disaster.—A large mass of rock, on April 29, from the top of Turtle Mountain overlooking the coal mining district of Frank, fell into the canyon of Old Man's Creek, damming it, wiping out the surface works of the French Canadian Coal Company and destroying a number of dwellings. The total loss of life is estimated at 90, though later reports may lower the number. The landslide is attributed to an explosion of gas in the mines.

Northwest Coal and Coke Company.—This company, of McLeod, has been floated, and President Louis Ernst says he has placed bonds to build and equip 17 miles of railway to connect the new coalfields with the Crow's Nest division of the Crow's Nest Pass Railway. Donald McLeod, of Nelson, has the contract to build the road.

BRITISH COLUMBIA—BOUNDARY DISTRICT.

Cariboo-McKinney.—This company is reported working 40 or 50 men in the mine and the mill. One 8-hour crew in the mine is enough to keep two 8-hour shifts a day employed at the mill handling about 40 tons through 20 stamps. The company may sink a new shaft to the 600-ft. level. Now the 600-ft. level is reached through a winze and an old stope.

Mother Lode.—The force of men at this mine, near Greenwood, has been increased to about 75. Ore is sent freely to the British Columbia Copper Company's smelter.

Nickel Plate.—Work on reduction works at Hadley City, Similkameen, for treating ore from the Nickel Plate Mine on Twenty-mile Creek, is being pushed.

Stemwinder.—There are 52 men on the payroll of the New Fairview Corporation at Fairview, at work in the mine, stamp mill and cyanide works. It is stated that all the 46 stamps in the mill are dropping and that the cyanide plant is working well.

NOVA SCOTIA—CAPE BRETON.

Eastern National Copper Company, Limited.—This company, organized last September by Halifax parties to develop a deposit of copper-gold ore at Cheticamp, is opening an office in Boston, Mass. At the mine, under the management of Walter M. Mage e, day and night shifts are engaged on a stope being cut through the ore to connect with a tunnel 1,000 ft. long. H. M. Blewett, formerly mine captain at the Wabana iron mines, has been engaged as superintendent and assistant to the resident manager, M. V. Grandin.

Dominion Coal Company.—In this company's Reserve Mine at Glace Bay ventilation has been restored. At No. 1 bore hole, level shows water close to point where fire started. It will be several days before definite information can be given. Temperature is dropping, showing the fire to be inactive.

ONTARIO—HASTINGS COUNTY.

H. F. E. Gammon, of Rutherford, N. J., with his associates, M. M. Johnson, Charles B. Wolf and Robert E. Cushman, has bought 1,500 acres of land near Bannockburn, containing veins of galena. One vein, 4 ft. wide, is reported uncovered for 1,800 ft. A shaft has been sunk 65 ft. A hoisting plant is in place, and a crushing outfit and a smelter are being erected. Mr. Gammon is superintendent and general manager.

ONTARIO—MICHIPICOTEN DISTRICT.

Helen.—According to a Michigan paper this mine, is not developing into the magnificent proportions prophesied by many who have written of it in the newspapers. With less by far than a 1,000,000 tons sent out, the mine's limits are said to be known, and its time of activity will not continue long into the future unless something new is revealed. The deposit has "pinched" until it is now a small one compared with original showings on surface.

YUKON TERRITORY.

A dispatch from Dawson says that sluicing out all the creeks in the Klondike began on April 27. Gov. Congden says that Canada will not establish an assay and gold purchasing office at Dawson. Overland trail traffic has ceased, and the river navigation, it is expected, will open about May 20.

CUBA.

Cuban Mining and Development Company.—This company has sunk 2 shafts over 200 ft. at Bahia Honda, and taken out about 200 tons of copper ore. A force of 160 men is employed. The shafts are three miles from the wharves at Bahia Honda, and a traction engine has been shipped from New York.

MEXICO.

SONORA.

Bufa Mining, Milling and Smelting Company.—A concentrating plant and reverberatory furnaces are being put in at La Bufa by this company, which plans to ship high-grade matte instead of concentrates. At present the ores are treated by lixiviation, and high-grade ore shipped. A pumping plant is being installed. The nearest railroad point is 160 miles, and transportation is by packing. D. Richardson is president; F. Richardson, secretary; W. Richardson, general manager; E. George, acting superintendent, and E. M. Clark, metallurgist.

Yaqui Smelting and Refining Company.—A 125-ton custom smelter and refinery is being built at Toledo by this company. The site is 90 miles east of Torres. The machinery consist of a 100 by 36-in. and a 36-in. circular blast furnace, softening and calcining furnace, etc. The plant is expected to be in operation in six months. This is the first custom plant of its kind in Sonora. The constructing engineer is H. C. Gerber, formerly of Parral. F. Davis is general manager.

MINING STOCKS.

(Full quotations are given on pages 693 and 694.)

New York April 29.

Coppers are quiet, fluctuations being about as narrow as the trading, which is done mostly by professional operators. Amalgamated moved at $62⅝@$65, and its protege, Anaconda, at $25.50@$26. Curb coppers reflected the apathy in their superiors on 'change. Tennessee receded from $29¼ to $28¼, on comparatively few sales; United, of Montana, to $20; Greene Consolidated, of Mexico, from $23⅞ to $23⅜, and British Columbia from $4¾ to $3⅝. A better feeling prevails in White Knob, of Idaho; hence a gain to $13.

A sale of Quicksilver preferred stock, of California, is noted at $7¼. The company will pay its customary dividend of 50c. on these shares next month, which is equal to ½ of 1 per cent annually. An odd sale of 15 shares of Standard Gold established the price of $3.

Colorado stocks have been in better request. Among the Cripple Creek sales were Portland at $1.45; El Paso, 63c.; Elkton, 40c., and Isabella, 17½c. A sale of Iron Silver, of Leadville, is reported at $1.60.

The Comstocks showed the usual trading. Consolidated California and Virginia brought $1.45; Ophir, $1.55@$1.60, and Hale & Norcross, 75c.

A notable feature this week was the dissolution of the $200,000,000 syndicate which was formed to underwrite the securities of the United States Steel Corporation. The syndicate was headed by J. P. Morgan & Co., and furnished $25,000,000 in cash. The

return was $46,000,000 in cash dividends, and $4,000,000 in stock, or approximately 200 per cent. This is considered one of the most profitable syndicates ever organized.

Boston. April 28.

(From Our Special Correspondent.)

After a dull and uninteresting week copper shares show an improved tone. Late last week stocks went up easily, but the interest soon subsided and prices ran off again. To-night the tone is firm, with a prospect of better prices. The pubic, however, is not a factor, and the market is being made by traders, who change with the wind. The sharp break in the metal from London brought in realizing sales. Taken altogether there is a lack of snap to the market, and certainly there is no leader at present. Some liquidation has been noticeable in the second-class stocks.

A temporary covering by Canadian interests in Dominion Iron and Steel caused an advance of $3.12 to $32, but in sympathy with a sharp break in Dominion Coal from $111 to $103, caused by an explosion at the mines. Dominion Iron fell back to $27.25, Dominion Coal recovered $5 of the loss.

Copper Range took a sharp drop to $61.50, and for a while it looked as if the bottom had dropped out of the market altogether. From this it recovered to $64, which is $2.50 lower than a week ago. A certain strong local interest is said to have sounded this stock, with a view of making terms for the deal that is afoot. The better and investment class of stocks show little variation. Calumet & Hecla holds well at from $522 to $530; Quincy at $118@$114, and Tamarack at $148@$145; Wolverine fell $5 to $70, on knowledge that the mine was closed down as a result of a strike of the trammers. These men are now back at work again. Trimountain holds around $90. Centtennial shows wide fluctuations, from $28.25 to $24 during the week, and closing at $25.75. Winona rose $2.37½ to $12.62½, closing at $11. The rock at the property is said to resemble Trimountain, and the stock is held to a large extent by interests connected with Trimountain. Osceola dropped $4 to $65; Mohawk, $4 to $50, and Parrot, $2 to $27. Utah settled $1.37½ to $28.25, recovering $1. It is now expected that the company will be turned over to the American corporation in a short time, and dividend payments will be deferred until then.

Daly West, of Utah, has advanced $4.75 to $48 on investment absorption. The company is paying 60c. per month, and there is talk of an increase. The company is adding to its surplus each month. Shannon Copper has been made active, but with little net change. The company is said to be turning out 1,000,000 lbs. of copper per month.

Granby Consolidated Mining, Smelting and Power Company, Limited, has been listed, and made its first appearance on the tape at $4.75@$5. It subsequently touched $5.12½. The amount listed is 1,336,303 shares.

Bingham sold at $32.37½@$31.37½. The Eagle & Blue Bell option is taken subject to examination and development. United States settled $1 to $24.37½, recovering a part.

Colorado Springs. April 24.

(From Our Special Correspondent.)

The mining stock market during the past week has shown more activity than for several weeks past, and prices have, as a rule, held steady. Advances where made have been maintained, and the declines have been but fractional. The general average of prices is somewhat higher than a week ago.

In the mines list C. K. & N. showed an advance of a cent, closing a week ago at 18c. bid, and to-day at 19c. Elkton was fairly steady during the week, selling from 37@37½c. It sagged to 36⅝c. on the 23d, but again sold at 37c. to-day. Gold Dollar Consolidated was the most active trader in the list, about 90,000 shares changing hands at advanced prices. On the 17th this stock was offered at 5⅛c., with 5c. bid; to-day the closing quotation was 5⅜@5⅝c., selling at 5½c. Portland made a slow but steady gain; the closing quotation a week ago being $1.36 bid, while to-day $1.39½ was bid, with considerable stock selling at $1.40. Isabella sold from 16@16¼c. on the 17th, gradually weakening to 15⅞c. to-day. Vindicator was steady at $1.

In the prospect list Dead Shot was an active trader, scoring an advance of ¾c. on a reported strike of pay-ore at grass roots; 2½c. was bid for this stock a week ago, and 3¼c. to-day. Old Gold was also a popular trader at advanced prices. The closing quotation a week ago was 4⅝c. bid, while to-day 5c. was freely bid for the stock.

Salt Lake City. April 25.

(From Our Special Correspondent.)

The market for the week has shown greater activity than for some weeks past. A greater number of stocks on the board have been traded in and the general list has advanced in price. Some of the lower-priced stocks have been the most active, but have not registered the gains nor affected the tone of the market as have the higher priced shares. Daly West has moved up to $43.75 from an opening at $42.80, and has recorded 940 shares sold. Daly-Judge remains steady at $9.40@$9.20, with sales of 2,195 shares. Ontario had sales of 100 shares at $5.70. Consolidated Mercur moved a fraction forward and sold at $1.50½, with one small lot going at $1.44½. Wabash had an active week, showing sales of 29,550 shares at 30@22c. Sacramento sold 20,100 shares at 28½@26¾c.; Lower Mammoth, 12,400 shares at 56½@51c. Of the unlisted stocks Comstock, of Park City, had sales of 500 shares at $1.62½@$1.60, and Naildriver 800 shares at $1.75. Majestic, of Beaver County, sold 500 shares at $3. Little Bell, of Park City, again appears on 'change selling, 800 shares at $3.35@$2.90. The total amount of business was 234,011 shares that brought $133,648.

San Francisco. April 25.

(From Our Special Correspondent.)

Further symptoms of weakness in mining stocks developed this week, and several declines are noted. Trading was comparatively light, with little outside interest shown.

Some quotations noted are: Caledonia, $2.15; Ophir, $1.60; Best & Belcher, $1.55; Consolidated California & Virginia, $1.45@$1.50; Mexican, 97c. @$1; Sierra Nevada, 75c.; Hale & Norcross, 69c.; Potosi, 24c.

Business in oil stocks was fair, and prices generally good. Twenty-eight sold at $3.50; Sterling, $3.15; Home, $2.55@$2.60; Pittsburg, 45c.; Sovereign, 42c.; Oil City, 30@31c.; Lion, 7c.; Independence, 6@7c. The better part of the business done was in the higher-priced stocks.

COAL TRADE REVIEW.

New York, April 30.

ANTHRACITE.

There has been no especial change in the anthracite trade during the week, except so far as warmer weather has affected retail buying at many points. Wholesale trade shows no change, demand being brisk. The output of the mines has been hindered somewhat by misunderstandings among the miners over the terms of the award of the Anthracite Commission, or by a somewhat pronounced tendency among the miners to take things as easily as possible.

The congressman-elect and newspaper owner who is flying his political kite with a long string, and has succeeded in getting the Interstate Commerce Commission to attract attention by investigating the traffic and coal-handling arrangements of the anthracite railroads, may be in earnest, and his efforts may be based on the purest motives, but anyone fortunate enough to hear President Baer's testimony must have felt that Mr. Baer, at least, is a strong man, and a sincere man, and is trying to make a paying proposition out of the interests he controls. Even the newspapers controlled by the real plaintiff in the case did not answer some plain and forceful statements.

At the head of the lakes a pretty heavy tonnage of anthracite is arriving, and the movement from docks during May promises to be unusually heavy. In Chicago territory business, both wholesale and retail, has been very active, and what coal has arrived at docks has been covered by out-of-town orders. At lower lake ports and in Canadian territory demand is very strong. Shipments from Buffalo have been restricted somewhat by light receipts, attributed to short car supply. Along the seaboard dealers are giving almost their whole attention to anthracite, and little yards at all manner of out of the way points are trying to get all the coal possible at April and May prices. The steam sizes are in good supply, and a large tonnage is being sold.

BITUMINOUS.

The Atlantic seaboard bituminous trades remains quiet and dull. Ot New York Harbor shipping ports the price of Clearfield coal f.o.b. is now $2.75 for ordinary grades, though some Clearfield is offered at lower figures. Considerable coal is arriving at tidewater points, and shippers find trouble in disposing of it. Many operators are believed to be curtailing outputs in various ways. This is the season when prices usually are lowest, anyway, for consumers wait until summer, when coastwise transportation is lower, before ordering heavily; or in any event, often delay ordering, preferring to have working capital in the bank rather than in the coal pile. The attention given anthracite by dealers is also a factor of importance in restricting sales of bituminous. A possible strike of the tug engineers on May 1 is receiving attention, as it may affect coastwise shipments seriously for a while. The wages asked by engineers amount in some cases to 45 per cent, which, in the case of a steam lighter, might amount to an increase of 20c. per ton in handling coal. A proposition to sell coal according to seaboard prices, the prices being made monthly, is causing considerable discussion. Last fall the question of a sliding scale, such as now prevails in the anthracite trade, prices to be lowest on April 1 and increase monthly, thus stimulating buying during what are the dull months, was discussed, and something may come of the present discussion before next year.

Trade in the far East is quiet; some coal is arriving on new contracts. Along Long Island Sound trade is very slow, dealers giving their attention chiefly to anthracite. New York Harbor trade is dull, though the limited storage room of dealers and shippers calls for more shipments, comparatively, than to other territories. The all-rail trade moves along quietly, consumers generally taking about enough coal to keep what stocks they have on hand intact.

Transportation from the mines to tidewater is very good, coal running through sometimes in three or four days. As to car supply at the mines, it is thought that anybody wanting cars can have 75 or 80 per cent of all he can show he is able to handle at tidewater, but there are a number of embargoes on shippers at the mines who have coal standing at tidewater. In the coastwise vessel market vessels of all classes are very scarce and in demand. Freights are firm. We quote these prices from Philadelphia: Long Island Sound, $1; Boston, Salem and Portland, $1.25; Lynn, Gardner and Bangor, $1.40; Newburyport, $1.50; Saco, $1.40@$1.50; Bath, $1.30. From New York Harbor rates are 65@75c. to Long Island Sound points, and $1.15@$1.25 to points around Cape Cod.

Birmingham. April 27.

(From Our Special Correspondent.)

Several operators who do not work union miners are making contracts with their miners for the twelve months commencing May 1. The union miners do not hold their scale convention until the middle of June. The production of coal in Alabama is strong, and promises to continue so for the entire year. J. M. Gray, who was recently appointed by Governor Jelks as chief mine inspector, to succeed J deB. Hooper, whose term expires next month, states that the coal production is heavy. Coal prices are being maintained.

Rumors to the effect that the United States Steel Corporation will enter into coal, iron and steel operations in Alabama, have caused no little talk. The rumors are not to be verified. According to the story the big corporation has options on lands on the Birmingham Mineral Railroad, between 6 and 8 miles north of here, and besides opening mines and building coke ovens, it is asserted furnaces and a big steel plant will be erected.

Chicago. April 27.

(From Our Special Correspondent.)

The coal market is just recovering from the brief depression caused by a surplus of fuel poured into Chicago, together with an unusually large quantity of coke last week. By a combination of circumstances much more coal was headed for this city than the market could well take care of, and competition was unusually active for a few days. To-day shows a good recovery, and by the middle of the week normal conditions for this period of the year will doubtless be reached. Country trade, like that of the city, shows something of dullness.

Smokeless is quoted at $4; Hocking at $3.50; Youghiogheny, $3.60; Pittsburg, $3.50; Indiana and Illinois lump and egg, $2.50@$2.75; smithing coal at $4.25. These are minimum car-lot quotations. The demand for smokeless continues strong, and smithing coal is, as usual, scarce. Orders are very plentiful for the better grades of bituminous. Apparently, smokeless is coming permanently into favor with users of steam coal.

Anthracite continues at $6, and is plentiful, the demand not yet coming up to expectations based upon the scarcity of last winter. The April buying is especially small, although there is every probability that this year, as in previous years, the price is the lowest of the year. It appears to be believed by the average consumer that coal is bound to be high for a few months at least, and that normal market conditions will not exist until the middle of summer.

Dealers report that the active movement of coal on the railroads, due to the per diem charge for cars, is having a beneficial effect on the trade. The full effects of this charge are now being realized, through general enforcement of demurrage rules, and while the coal must be handled speedily, the trade finds a compensating benefit in the release of the cars for more traffic.

Cleveland. April 28.

(From Our Special Correspondent.)

The coal trade of the lakes has been strong during the past week, with an upward tendency in freights. Many of the shippers had rushed coal to the lakes at the opening of the season, and did not have boats in which to load all that arrived. The railroads began demanding that the cars be emptied, and it seemed for a time as if it would be necessary to name a higher figure for vessels in order to attract them to the trade. The natural supply of tonnage, however, increased to meet the demands of the shippers before any advance was necessary. The freights have therefore held firm at 40c. to Duluth; 50c. to Milwaukee.

The only change was an advance of 5c. to Escanaba, that rate having been marked up to 50c. Nothing has been done in the way of season contracts for carrying coal, although negotiations are on that may end in some contracts before the week is out. The prices have not changed from the quotations made a week ago; namely, $2.45 for lump, from Pittsburg and West Virginia mines, and $2.35 for lump, from the Ohio mines. The other grades are scaled upon these prices.

The demand for coal in the domestic trade has been good and the supply has been adequate. The factories have not lacked for fuel at any time, and the market has been firm. The coke supply in the Valleys has been normal and the production has continued without interruption. There have been reports of car shortages in this territory, but they have not interfered with the coal or coke supply as yet.

Pittsburg. April 28.

(*From Our Special Correspondent.*)

Coal.—The mines in the Pittsburg District are in full operation, and no complaint is made of a shortage of railroad cars. A heavy tonnage is going to lake ports, and but little new business is being accepted at the prices fixed on April 1. It is intended to send the bulk of the production to the northwestern trade if transportation facilities continue favorable. The work of organizing the miners along the Pennsylvania Railroad in the Irwin field is being vigorously pushed. There are fully 25,000 mners in that section, and when properly organized a demand is to be made for a higher mining rate. If a strike results it will benefit operators in this district, as the present demand will be increased and higher prices will rule.

Connellsville Coke.—Coke is moving more promptly, and the production is increasing. It is expected that normal conditions soon will prevail. The prices are not as high and furnace coke can be bought at $3.50 for delivery through the last half. Foundry coke is quoted this week at $4.75 a ton. The *Courier*, in its last report, gives the production for the previous week at 249,025 tons, an increase of about 500 tons. The shipments aggregated 11,725 cars, distributed as follows: To Pittsburg and river tipples, 3,672 cars; to points west of Pittsburg, 6,300 cars; to points east of Connellsville, 1,953 cars. This was a gain in shipments of 125 cars.

San Francisco. April 25.

(*From Our Special Correspondent.*)

Trade has been quiet, with about the usual arrivals. Stocks are good, except in Eastern coals. No change in prices is noted.

Yard prices to dealers for Pacific Coast coals in large lots are as follows: Wellington, $8.50; Southfield, $8; Rosslyn, $7; Seattle and Bryant, $6.50; Coos Bay, $5.50; white ash, $5. Rocky Mountain coals in car-load lots are quoted at $14 for Colorado anthracite, and $8.50 for Castle Gate, Clear Creek, Rock Spring and Sunnyside. Eastern coal in cargo lots is at present nominal, but quotations continue at $14 for Pennsylvania anthracite and $12 for Cumberland. Foreign coal in cargo lots sells as follows: Welsh anthracite, $13; cannel, $8.50; Brymbo, $7.50; Wallsend, $6.50.

Mr. J. W. Harrison's latest circular, of date April 23, is as follows: "Since the *Ventura* left there has been but one arrival, the *Asnieres*, with 3,820 tons of coal, in all but three deliveries of Australian coal in over three months. The showing within the next three months will be a very different one. The chartered list of coal carriers from Newcastle and Sydney foots up 69 vessels, with a carrying capacity of about 200,000 tons. This is 5,000 tons in excess of the total importations of Australian coal for the year 1902. These liberal engagements have naturally forced coal freights upward, and 13s. 6d. per ton is now freely offered for Newcastle loading. There is a detention of over 60 days at Newcastle, between the time of arrival and loading, and it is almost assured that in June and July next the detention will be at least 30 days more.

"There is no evidence of an early settlement of the labor disturbances at the collieries in British Columbia. The only hope seems to be that the Government may come in through its representatives as a mediator, as it is very evident that James Dunsmuir will not be forced into any recognition of the unions nor be subject to any of their dictations.

"The collieries at Seattle and Tacoma are reaping a harvest from the light shipments from British Columbia, as they are crowding their product into market. There is great uncertainty as to the steps that will be taken at the next meeting of Congress in reference to the retention of coal on the free list. This is one of the principal reasons why importers are shipping so freely from the colonies just at this time."

Foreign Coal Trade. April 30.

Export trade here continues very light, while there is nothing new in imports.

Messrs. Hull, Blyth & Co., of Cardiff and London, report under date of April 17, that owing to the amount of tonnage in dock and the limited output since the holidays, prices are firm all round, and there is a fairly good inquiry for all descriptions of coal. Quotations are: Best Welsh steam coal, $3.48@$3.54; seconds, $3.42; thirds, $3.30; dry coals, $3.30; best Monmouthshire, $3.12@$3.18; seconds, $3.06; best small steam coal, $2.22; seconds, $2.10; other sorts, $1.80.

The above prices for Cardiff coals are all f.o.b. Cardiff, Penarth or Barry, while those for Monmouthshire descriptions are f.o.b. Newport, exclusive of wharfage, but inclusive of export duty, and are for cash in 30 days, less 2½ per cent discount.

Outward chartering is quiet. Rates remain firm. Some rates quoted from Cardiff are: Marseilles, $1.70; Genoa, $1.62; Naples, $1.62; Las Palmas, $1.62; St. Vincent, $1.80; Rio de Janeiro, $2.40; Santos, $2.88; Buenos Aires, $1.98.

IRON TRADE REVIEW.

New York, April 30.

The iron market is developing somewhat of a waiting tendency, and large consumers are inclined to hold back on orders for fourth quarter deliveries. It should be understood that most of them are supplied for the second and third quarters, but there is a good deal of fourth quarter business still open. This is especially noticeable in pig iron and steel billets, in which very little business is reported. In finished material, the conditions is nearly the same, matters being rather quiet. In structural material a good deal of jobbing business has been done, but large orders from first hands are not recorded. In the East, there is a good deal of inquiry for Middlesboro and Scotch pig, and for German basic iron and billets, although no large business is reported. The iron markets abroad are rather quiet, and it is said makers are accepting a somewhat lower range of prices.

Coke is generally in good supply now at mills and furnaces, and the railroads are in fair condition, both as to deliveries of ore and coke, and also as to carriage of finished material. Some delay is reported at Lake docks where the handling of ore does not yet proceed very freely. Vessels are beginning to come down the Lakes, and unless conditions are better, there is likely to be some congestion.

Birmingham. April 27.

(*From Our Special Correspondent.*)

General quiet in the pig iron market in this section of the country is accounted for by the fact that consumers are still holding off on all buying except for immediate needs. Both association and non-association furnacemen state that there is very little buying going on except for immediate delivery and in small lots. No indications are given by Alabama and Tennessee iron makers of a cessation in the near future in iron making; to the contrary, all preparations are for a steady operation of furnaces. There are some furnaces in this section needing repairs . Announcement is made that no efforts will be made to blow out any of these furnaces until there is actual necessity for so doing. Philadelphia Furnace, of the Sloss-Sheffield Steel and Iron Company, at Florence, which went into blast last week, is doing well. The Shelby Iron Company during the past week blew in one of the charcoal furnaces at Shelby, which had to go out a few weeks since for repairs. This company (a close corporation), held a meeting in New York in the past few days, and the affairs of the concern were shown to be in first-class condition

Railroad officials seen say that the shipments of pig iron are still heavy, with no signs of abatement. The demand for cars with which to move pig iron is strong, and all companies are urging prompt movement of the product.

Quotations show no change. Western consumers are still working to get the prices allowed the Eastern people. A general reopening of the buying is looked for shortly, when it is established that the manufacturers will give no further reductions. The following prices prevail (Western): No. 1 foundry, $18 @$19; No. 2 foundry, $17.50; No. 3 foundry, $16.50@$17; No. 4 foundry, $16@$17; gray forge, $15.50@$16; No. 1 soft, $18@$19; No. 2 soft, $17.50.

The work of making improvements at the steel plant at Ensley, belonging to the Tennessee Coal, Iron and Railroad Company, is being pushed. The big engine in the blooming mill department has been placed and is now being adjusted. The repairing of the open-hearth furnaces is nearing completion, and the production of steel will be increased as soon as possible. The manufacture of steel rails is not yet on as large a scale as is desired at this plant. The plant of the Alabama Steel and Wire Company is working steadily with a good demand for the products. There is still a scarcity of steel for this industry.

Rolling mills continue to do well, especially those at Birmingham, Gate City and Bessemer. The Anniston rolling mills are being thoroughly repaired by the new owners, the Weller Rolling Mill and Forge Company, a corporation with $60,000 capitalization. Foundaries and machine shops continue to work steadily, and have plenty of orders for the future.

Chicago. April 27.

(*From Our Special Correspondent.*)

Quietness characterizes the pig iron market. There has not been any noticeable change from the conditions of the perceding week. Buyers are apparently holding off until the last moment, in the expectation that they can buy on more favorable terms, and few large sales are being made. There is a glut in the coke market, apparently due to the releasing of many more cars for coke-carrying than were available a few weeks ago. Contract coke is selling for $7.50 @$7.65, and much has been sold at prices close to $7, in the last day or two. The lowest point of the slump in coke was reached about the middle of last week, when sales were made at $5@$6.

As soon as the situation was realized shipments were diverted, causing a recovery of the last day or two. It is believed by leading dealers in coke that the low prices have come to stay, at least until the beginning of next winter. Production of coke, they say, has at last caught up with the demand, and transportation has been so greatly bettered by the coming of warm weather, that no fault is likely to be found with the railroads. Foundrymen are of course, elated with this condition of things, and Western furnace proprietors share in the general satisfaction. The sale of iron, while not large, is steady, and both Northern and Southern are well sold out into the third quarter of the year.

For delivery six months hence or thereabouts, Southern No. 2 is quoted at $17, Birmingham, or $21.35, Chicago, as last week. Northern is also unchanged, bringing $21.50. These prices are for moderate orders; small lots are quoted 50c. higher. No. 1 brings 50c. more and No. 2 sells at 50c. less than the foregoing on similar lots. There is little Northern in the market.

Cleveland. April 28.

(*From Our Special Correspondent.*)

Iron Ore.—Almost all of the shippers of ore have made contracts covering their movement for the year. All charters have been made at the rates with which the season's market opened, namely, 85c. from Duluth to Lake Erie; 75c. from Marquette to Ohio, and 65c. from Escanaba. Most of the activity this week has been with spot chartering for loads to be shipped immediately. The vessel tonnage has been in excess of the demand, and the market has been weak, The lower lake ports present the one feature which is discouraging. The delays at the unloading machinery are long because of the lack of cars and the fact that the dock machinery is not in good working order. Many shippers are not preparing to move as much contract material as formerly, believing that the wild rates will be better than the contract rates, and the vessel men hold the opposite opinion that wild rates will be more advantageous. The selling prices of ore have not changed, being based on $4.50 for bessemer old range and $4 for bessemer Mesabi.

Pig Iron.—The market this week has been dull for all grades. No foundry is sold by Valley furnaces for May and June delivery, as they have none, all material coming from outside of this territory. Second half buying has been dead for several weeks, and there is no activity immediately in sight. The uncertainty as to prices is said to be partly responsible. The quotations do not change from $22, Southern Ohio furnace, for first half, and $21@$21.50 for second half, Valley furnace, for No. 2. No basic is being sold for immediate shipment, because there is none. Second half buying is also held up. The prices do not change from $21.50 for first half and $20 for second half. Bessemer is entirely off the market for both first and second half delivery, and the quotations are nominal. They are $21.50@$22 for first half, and $20.50@$21 for second half, Valley furnace.

Finished Material.—The market has heard of more transactions this week in bar steel. One contract covering about 3,000 tons has been reported in bessemer, and a few small lots in open-hearth. The general buying, however, has not been resumed, largely because some of the bigger consumers have not been able to convince themselves that the prices were not to be changed. It is understood that they have now decided to come in and will close their contracts before the week is out. Bar iron is not active. The prices are: 1.60c., Pittsburg, for bessemer steel; 1.70c., Pittsburg, for open-hearth; and 1.85c., Youngstown, for bar iron. Structural is stronger, with a better demand than has appeared for weeks. The mills have been offering such good deliveries that premiums from the smaller concerns are no longer paid. The jobbers report a steady business. The prices have not changed from 1.60c., Pittsburg, from the standard mills, and 2.15@2.25c., out of stock. Plates have been only fairly active, very little if any business being done by the larger mills; specifications, however, are good. The smaller mills have been able to get 2c., Cleveland, which is a slight reduction. The larger mills are so well filled up that they can take

no business. The sheet trade has been strong. Some of the mills might accommodate a little business, but they have not been suffering, and the trade looks good for the entire summer. The prices are still based on 3.10@3.25c., for No. 27 black sheets, out of stock. There have been further inquiries for rails during the week, but no engagements have been reported. The mills are pretty well filled up. Prices remain unchanged at $28 for standard, and $36 for light rails.

Old Material.—The market has been strong with a few good sized orders, and many smaller contracts. Steel scrap is scarce and in good demand. Prices are firm.

Philadelphia. April 29.

(From Our Special Correspondent.)

Pig Iron.—More than usual attention is being given just at present by a number of large consumers to English and German pig iron as is shown by the exchange of cablegrams. So far as this market is concerned no business of importance has been transacted for a week. Two reasons are assigned, the lack of urgent necessity for immediate shipments and the declining tendency in iron abroad. Prices for iron are as follows: No. 1X foundry, $22.50; No. 2X foundry, $21.50; No. 2 plain, $20.50; gray forge, $19.50; basic iron, $20; Middlesbrough, $20.50; Scotch iron, $22@$23.50. To-day's quotations for cargo lots of low phosphorus are given at $21, which shows a farther decline; bessemer, $20.25, and Middlesbrough No. 3, $19.

Billets.—The anxiety of a few Eastern consumers of billets to obtain supplies promptly has had the effect of increasing the premium upon quick deliveries. Orders have been sent abroad within 24 hours, and prevailing quotations for German billets are $29.50 on dock; basic open-hearth domestic, $33.50, delivered.

Merchant Bar.—Bar iron mill managers are making an effort by a sort of canvass to accumulate some business on their books, and they have succeeded thus far in doing this without developing any weakening tendency. Refined bar iron is worth about 2c.; steel bars, 1.75@1.85c.

Sheets.—A few large orders for sheets during the past week or ten days have had a stimulating effect upon this branch of industry. This improvement in business was expected to show itself earlier, and buyers who tried to crowd the market down a little earlier in the month have apparently decided to come forward. The mills are filling up.

Skelp Iron.—The skelp iron market is strong so far as quotations go, there being no sign of concession even where large orders are placed.

Pipes and Tubes.—The pipe and tube mills are too well filled up with business to afford any reasonable hope that concessions will be extended. The situation is very strong, and it will probably remain as it is.

Merchant Steel.—Shafting is very firm, and considerable business has been heard of since last report. Open-hearth steel is meeting with better demand, and open-hearth spring is quite active. Ordinary grades of tool steel are selling more freely than for several weeks.

Plates.—The frequency of orders for small lots, and occasionally 1,000-ton lots, with signs of much more business to come in very soon, afford the plate manufacturers much encouragement. A vast amount of construction is now wheeling into line, as it were, and the requirements for this work will shortly be presented. Car-load lots of ¼-in. plate readily command 1.90c.; universals, 1.90@1.95c.; flange iron, 2.10c.; marine, 2.20c.; firebox, 2.30c. In the latter product quite an amount of business is now being put through.

Structural Material.—Though a large amount of work has been done in structural material during the past week or two, those who represent this branch say that the mill managers are now figuring upon another large amount of business for delivery during the summer months. Quotations range from 1.73½@1.78½c. in a retail or car-load lot way; much of the business coming in is in very heavy lots, but the figures at which this business is done, are not intended for the public.

Steel Rails.—Girder rails are attracting even more attention than a week or two ago. The market is very strong, mills are crowded with work, new trolley line work is coming up, and the outlook is favorable.

Old Rails.—Old rails are quoted very strong at $22 for steel and $25 for iron, but there does not appear to be much business going.

Scrap.—The particular demand at present is for heavy steel, country scrap and No. 1 wrought railroad. It does not appear that there is any difference in prices, and the scrap dealers generally dictate what they shall be.

Pittsburg. April 28.

(From Our Special Correspondent.)

The pig iron market has taken a turn and conditions show an improvement over those of a week ago. Outside of one lot of 10,000 tons of bessemer sold about 10 days ago at $19.65, Valley furnaces, all sales have been above $20. The latest sale of any consequence was one of 3,000 tons yesterday at $20.15, Valley. Several small sales are noted at slightly higher prices. The agents for Southern iron, who seemed disposed to shade the low rate made on April 1, are insisting on the original price, and this evidently is responsible to a certain extent for the strengthening of the pig iron market in this district. As an indication that prices of the Southern product are to be maintained a sale of 1,000 tons of forge iron was made yesterday at $19.85. No shading has been noted, although several lots of different grades have been sold during the week. The coke movement continues up to requirements, and the production of pig iron is greater than it has ever been, and there is no stocking of iron, as all that can be turned out in the next few months is sold. Valley furnaces have not yet caught up on their contracts for delivery up to April 1. There is but little demand for prompt iron, which enables the furnaces to take care of old orders. The general freight situation is entirely satisfactory, and, contrary to expectations, the opening of lake navigation and the heavy shipments of coal have not interfered with coke or pig iron deliveries. The United States Steel Corporation has permitted its option on 140,000 tons of bessemer pig iron to expire. The price named for this tonnage was $20, Valley furnaces, and from present indications it seems doubtful that a much lower price will rule. Some large sales have been made for delivery in the last half at $20 and higher. There is still a probability of labor troubles, and some furnaces may be forced to shut down for awhile, as it is announced that the National Association of Blast Furnace Workers and Smelters is determined to insist on an advance in wages. The organization has a large membership in the Mahoning and Shenango valleys, but has no strength in the Pittsburg District.

The scarcity of steel continues and the demand seems to be increasing. As a result prices are firmer than a week ago. The United States Steel Corporation's finishing mills are still short on billets, sheet bars and tin-bars, although the supply was increased by the changing of the National plant at Youngstown from steel rails to billets and sheet bars. Rails to fill pressing orders will be rolled at the Edgar Thomson Works at Braddock. The heavy demand for sheet bars is likely to result in large orders being placed abroad. One sale of German sheet bars has just been made. It calls for 1,500 tons, and the price named is $32.50 delivered. The demand for plates is as strong as ever, and some orders for early delivery have been turned down, while some have been accepted at premiums ranging from $2 to $5 a ton. A large tonnage of plates is going into structural work and steel car makers are heavy consumers.

The strike of structural iron workers has been settled, and in addition to ending the trouble with the American Bridge Company, a wage scale and working rules have been agreed upon with the recently organized Association of Iron and Steel Erectors. The new agreement goes into effect on May 1, and continues until January 1, 1905. There is an arbitration clause, and sympathetic strikes are strictly prohibited. The rate of wages for the Pittsburg District, which embraces a radius of 135 miles from the city, is 50c. an hour for an 8-hour work-day. This is an advance of 2½c. an hour over the existing rate of 47½c. The American Bridge Company resumed work yesterday on all of its contracts in this district, but so far has not been able to get a full quota of men. Some of its former employes obtained work elsewhere during the strike, but all are expected to return before the end of the week.

From information received from Columbus, where the annual convention of the Amalgamated Association of Iron, Steel and Tin Workers is being held, the delegates from the lodges of iron workers are making a determined fight for an advance in the base of the present favorable scale. The more conservative members are opposing the demands, as it is certain the manufacturers will positively refuse to grant an increase, and are more likely to insist on a reduction. The convention will be in session a week longer than usual.

Pig Iron.—The most important sale this week was one of 3,000 tons of bessemer iron at $20.15, Valley furnaces. Some small lots were sold at prices a trifle above this figure. There is but little inquiry for foundry iron for the second half, and it is likely that $21, Pittsburg, for No. 2, could be done. A lot of 1,000 tons of Southern gray forge was sold yesterday at $19.85, and the Valley furnaces are quoting 50c. higher for delivery at Pittsburg, and it is believed the Northern iron is worth that much more than the Southern product.

Steel.—Prices of bessemer and open-hearth billets are fully $1 higher than a week ago. Bessemer billets are quoted at $31.50@$32, delivered at Pittsburg, and open-hearth prices range from $32@$33. The demand for plates is as heavy as last week. The base price remains at $1.60c., but for prompt shipment premiums ranging from $2 to $5 are paid.

Sheets.—The sheet market continues strong, and in some instances independent mills obtain as high as 3c. for No. 28 gauge black sheets. The American Sheet Steel Company is still quoting 2.75c., but it is reported that an advance is to be ordered at an early date. Galvanized sheets, No. 28 gauge, are still quoted at 3.85c.

Ferro-manganese.—There is but little doing and prices remain unchanged. English 80 per cent is quoted at $50@$52.50.

New York. April 30.

Pig Iron.—The market continues rather quiet, though inquiries are better. We quote for early delivery Northern iron at tidewater: No. 1X foundry, $22.50; No. 2X, $21; No. 2 plain $20@$20.50. For Southern iron on dock, New York: No. 1 foundry, $21.75; No. 2, $20.75; No. 3, $20.

Bar Iron and Steel.—We continue to quote for large lots on dock: Refined bars, $1.95@2c.; soft steel bars, 1.80@1.90.

Structural Material.—The outlook for labor troubles on May 1 is less threatening, but demand for material will not improve till later. We quote for large lots at tidewater: Beams, angles, channels and tees, $1.75@2c.

Plates.—Labor troubles promise to cut down demand for a while. Tank, ¼-in. and heavier, is quoted at 1.90@2c.; flange, 2@2.05c.

Steel Rails.—The quotation remains $28 for standard sections, f.o.b. mills for 1903 delivery; light rails, $32@$36, according to weight. Relaying rails are $28@$30 for heavy sections and $33@$35 for light sections.

Cartagena, Spain. April 11.

(Special Report of Barrington & Holt.)

Iron and Manganiferous Ores.—Since last report there have been no shipments of ores from this port. Owing to the holidays, very little work has been done at the mines. At the beginning of the week dock laborers struck for shorter hours than those agreed to last year after the strike in the spring. There were, however, only lead and coal boats in at the time, and the various shippers took prompt and united action to provide non-union men. The strikers gave in on the second day.

Prices are firm at 6s. 9d.@7s. per ton, f.o.b. shipping port, for ordinary 50 per cent ore; 7s. 3d.@7s. 9d. for special low phosphorus; 9s. 3d. for 58 per cent specular ore. Magnetic ore, 60 per cent iron, is 11s. for lump and 9s. 6d. for smalls. Manganiferous ores range from 14s. 6d. for 20 per cent manganese and 20 iron, to 9s. 9d. for 12 manganese and 35 iron.

Pyrites.—Iron pyrites, 43 per cent sulphur and 40 per cent iron, are quoted at 10s. 6d. per ton. No shipments are reported for the week.

CHEMICALS AND MINERALS.

(See also Prices-Current on page 696.)

New York, April 30.

Buying is satisfactory to most sellers who understand that new business cannot be large at this season when regular contract deliveries meet the demand of the more important consumers. On the other hand, prices, with few exceptions, tend to hardness, and it is confidently expected that the market quotations will improve.

Portland cement manufacturers are busy, and the big municipal contracts have proved an important source of revenue. One result of the New York underground rapid transit tunnel, which has contracted for an enormous quantity of cement, is the proposed increase of $2,500,000 in the capital stock of the Atlas Portland Cement Company. This concern is comparatively new, having been organized in Pennsylvania in 1899, but in the past three or four years it has secured some of the largest cement contracts. The original capital was $7,500,000, of which $1,500,000 was 8 per cent dividend preferred stock. The property is situated at Copley and Northampton, Pa.

Cyanide of Potassium.—Trade is fair, and prices unchanged from 20c. per lb., f.o.b. New York. There was recently exported from New York 8,240 lbs. to Mexico, the average invoice price being about 20½c. per lb. Imports are light, and shipments from Great Britain to the United States are being made at the average of 17c. per lb., c.i.f.

Bleaching Powder and Chlorine.—There is not that unanimity among importers of bleaching powder which would make the market stable, and coupled with the aggressive competition of second hands, prices are irregular. In New York, Continental

bleaching powder for immediate delivery sold at $1.12½@$1.20 per 100 lbs., and Liverpool prime brands were obtainable at $1.25. Domestic bleach may be had at $1@$1.20 per 100 lbs., f.o.b. works. Chlorine, notwithstanding the fluctuations in bleaching powder, is unchanged in price at 30c. per lb. for liquid, and 10c. per lb. for water, f.o.b. New York.

Copper Sulphate.—Exporters place a value of about $4.41 per 100 lbs. on their shipments to Europe, and $4.03 to South America; the difference being due principally to the higher freight rate to European ports. Domestic trade is being satisfied at about $5.25, f.o.b. New York, while importers, acting on the firmer market abroad, are asking $5.50 for next month's shipments.

Acids.—Consumption has slackened off a little, but sellers are not alarmed, as this is considered a quiet season. Prices are unchanged. We quote as below per 100 lbs., unless otherwise specified, for large lots in carboys or bulk (in tank cars), delivered in New York and vicinity:

Muriatic, 18°..	$1.50	Oxalic com'l...	$5.25@$5.50
Muriatic, 20°..	1.60	Sulphuric, 50°,	
Muriatic, 22°..	1.75	bulk, ton....	13.50@14.50
Nitric, 36°....	4.37½	Sulphuric, 60°.	1.05
Nitric, 38°....	4.75	Sulphuric, 60°,	
Nitric, 40°....	5.00	bulk, ton	18.00@20.00
Nitric, 42°....	5.37½	Sulphuric, 66°,	1.20
		bulk, ton	21.00@23.00

Brimstone.—Recent arrivals have been sufficient to meet requests. Importers ask $22.50 per ton for early best unmixed seconds, while for shipments $22.25 is the minimum. Best thirds are worth $1@$1.25 per ton less than seconds.

Pyrites.—Demand is good, keeping prices at a profitable level.

We quote: Domestic pyrites, $5 per ton, for lump ore, f.o.b. Atlantic coast mines, and 10c. per unit for fines; sulphur content varies from 42@44 per cent. Spanish pyrites, carrying from 46@52 per cent sulphur, are quoted at 12@13c. per unit for lump, and 10@11c. for fines, delivered at Atlantic ports.

Nitrate of Soda.—Conditions are practically the same as reported last week, importers holding for $2 per 100 lbs. for spot, and $1.90 up for futures, according to position.

Chilean Nitrate of Soda Market.—Messrs. Jackson Brothers, of Valparaiso, write us under date of March 21, as follows: During the early part of the fortnight large transactions were effected in 95 per cent, extending up to March, 1904, at 6s. 5d. alongside, after which exporters showed little disposition to operate. On the other hand, the majority of producers have not been disposed to sell under our last quotations. For refined, the demand has not ceased for deliveries up to June at 6s. 8d. alongside; but transactions are few. The production for January and February amounted to 4,798,000 qtls., against 3,958,000 qtls., during same period last year. The consumption of the world was 7,144,000 qtls., against 5,257,000 qtls. We quote 95 per cent, March to April, 6s. 3½d.; May to June, 6s. 4d.; July to December, 6s. 4½d.; and 96 per cent, March to April, 6s. 8½d.; May to June, 6s. 8d., all ordinary terms sellers. The price of 6s. 3½d., with an all-round freight of 13s. 9d. stands in 7s. 8¼d. per cwt., net cost and freight without purchasing commission. Reported sales for the fortnight are 721,000 qtls.

Sulphate of Ammonia.—The American production is on the increase, and makers quote gas liquor for early shipment at $3.15 per 100 lbs., while the foreign article is worth $3.20@$3.25.

Phosphates.—Sanguine expectations have established a firmer stand among miners who are holding for higher prices. In Florida the hard rock people seem determined to wait for $5 per ton, f.o.b. mine. Similarly in Tennessee miners hope for better prices. In short, all have learned that the policy of rushing rock to the market at little or no profit just to keep the mines working is suicidal, especially as the supply of high-grade material is limited. South Carolina phosphates are in moderate request. Abroad American phosphates continue to advance, as the demand is already expanding, this being the busy shipping season. It is also true that conditions have been influenced by the report that the African mines are sold up for the greater part of their output to July, 1904.

Phosphate prices are as follows:

Phosphates	Per ton F. o. b.	United Kingdom or European Ports. Unit.	Long ton.
*Fla. hard rock (78@80%)	$6.50@$7.00	6¾@7¾d.	$10.86@12.25
*Fla. land peb. (68@73%)..	3.25@ 3.50	5½@5¾d.	7.70@ 8.05
†Tenn.. (78@82%) export.	3.75@ 4.00	6½@7d.	10.40@11.20
†Tenn., 78% domestic.....	3.25@ 3.50	.....	.....
†Tenn., 75% domestic.....	3.00@ 3.25	.....	.....
†Tenn., 73@74% domestic....	2.50@ 275	.....	.....
†Tenn., 70@72% domestic...	2.25@ 2.50	.....	.....
18o. Car. land rock.....	....@ 3.25	.....	.....
18. Car. riv. r'k (55@60%)	2.75@ 3.00	5¼@5¾d.	5.95@ 6.24
Algerian (63@68%)	.....	5¼@6¼d.	6.83@ 8.02
Algerian (58@63%)	.....	5¼@6d.	6.15@ 7.26
Gafsa (Tunis)	.....	5¼@6¼d.	5.64@ 6.60
Christmas Is. (80@85%)..	.....	7¼@7¾d.	12.04@12.87

* Fernandina, Tampa, Brunswick or Savannah.
† Mt Pleasant. ‡ On vessels, Ashley River

Liverpool April 15.

(Special Report of Joseph P. Brunner & Co.)

There is nothing new to report in the position of chemicals, but fertilizers are strong and nitrate of soda has been advanced for spot lots to £9 15s.@£10 per ton, less 2½ per cent for double bags, f.o.b. here, as to quality.

Exports of bleaching materials and sodas for the month of March, as taken from Board of Trade returns, are as follows: Bleaching materials to United States, 79,370 cwts.; other countries, 25,446; total, 104,816 cwts. Soda ash, 113,129 cwts.; caustic soda, 120,260; bicarb soda, 23,607; soda crystals, 16,331; saltcake, 64,394; other sorts, 22,697; total, 360,418 cwts.

As compared with the corresponding month of last year, the shipments show a marked increase. As new business has been quiet of late, the increase is no doubt accounted for by buyers having contracted ahead more heavily than was the case last year.

METAL MARKET.

New York, April 30.

Gold and Silver Exports and Imports.

At all United States Ports in March and Year.

Metal	March. 1902.	March. 1903.	Year. 1902.	Year. 1903.
Gold:				
Exports...	$4,432,948	$1,042,598	$15,072,101	$2,626,111
Imports....	2,636,313	4,472,061	5,739,067	8,031,666
Excess.	E. $1,796,633	I. $3,429,463	E. $9,333,034	I. $5,405,555
Silver:				
Exports ...	$3,301,291	$3,063,749	$11,751,886	$11,107,679
Imports....	2,306,499	1,479,771	6,419,823	5,060,743
Excess.	E $994,792	E. $2,183,978	E. $5,332,063	E. $6,046,936

These figures include the exports and imports at all United States ports, and are furnished by the Bureau of Statistics of the Treasury Department.

Gold and Silver Exports and Imports, New York.

For the week ending April 29, and for years from January 1:

Period.	Gold. Exports.	Gold. Imports.	Silver. Exports.	Silver. Imports.	Total Excess, Exports or Imports.
Week ...	$530,000	$223,412	$174,606	$70,047	E. $311,077
1903.....	1,857,450	2,750,930	5,961,810	657,581	E. 4,430,749
1902.....	16,442,351	1,036,340	10,640,922	458,009	E. 25,588,924
1901.....	16,397,994	1,008,302	12,511,205	1,417,297	E. 26,483,600

The movement this week has been principally with Europe and the West Indies

Financial Notes of the Week.

General business is steady, with no special changes to report. Foreign exchange has been higher, and one shipment of $500,000 gold is reported. It is quite possible that other shipments may follow. Money is comparatively easy, and this may be a convenient time to pay up some foreign indebtedness.

The statement of the New York banks, including the banks represented in the Clearing House, for the week ending April 25, gives the following totals, comparisons being made with the corresponding weeks of 1902 and 1901:

	1901.	1902.	1903.
Loans and discounts .	$884,444,900	$893,394,100	$900,625,100
Deposits	970,790,500	954,546,600	887,603,300
Circulation	31,314,900	30,970,300	43,538,000
Specie	187,157,800	173,094,000	164,275,100
Legal tenders	72,299,600	75,003,700	68,611,200
Total reserve	$259,457,400	$248,097,700	$232,886,300
Legal requirements ..	242,697,625	238,636,650	221,900,850
Balance surplus	$16,759,775	$9,461,050	$10,985,450

Changes for the week, this year, were increases of $313,100 in deposits, $43,000 in circulation, $3,302,600 in specie, $1,753,500 in legal tenders, and $4,977,825 in surplus reserve; a decrease of $4,582,200 in loans and discounts.

The following table shows the specie holdings of the leading banks of the world at the latest dates covered by their reports. The amounts are reduced to dollars and comparison made with the holdings at the corresponding date last year:

	1902. Gold.	1902. Silver.	1903. Gold.	1903. Silver.
N. Y. Ass'd.	$173,094,000	.....	$164,275,100	.....
England ...	181,771,140	.....	174,680,085	.....
France	515,136,595	$221,694,070	500,516,800	$220,943,600
Germany ..	194,895,000	72,090,000	156,700,000	54,880,000
Spain	70,455,000	91,545,000	72,395,000	101,035,000
Neth'l'ds ..	23,913,500	32,569,000	19,678,500	32,716,000
Belgium ...	15,989,000	7,990,000	15,513,335	7,756,665
Italy	80,640,000	10,631,500	88,745,000	11,375,000
Russia	368,360,000	42,495,000	382,170,000	40,815,000

The returns of the Associated Banks of New York are of date April 25, and the others April 22, as reported by the *Commercial and Financial Chronicle* cable. The New York banks do not report silver separately, but specie carried is chiefly gold. The Bank of England reports gold only.

Owing to scarcity of spot silver in London the price has sharply advanced from day to day during the last week; 25 1-16@25 3-16d. was obtained on Tuesday, but contracts having been settled, buyers to-day are waiting and watching the situation. Price of silver advanced too rapidly to be sustained, but after a fall an advance to 25d. again in the future is expected.

The United States Assay Office in New York reports receipts of 72,000 oz. silver for the week.

Shipments of silver from London to the East for the year up to April 16 are reported by Messrs. Pixley & Abell's circular, as follows:

	1902	1903.	Changes.	
India	£2,392,585	£2,331,500	D.	£61,085
China	16,500	121,775	I.	105,275
The Straits	250	148,391	I.	148,141
Total	£2,409,335	£2,601,666	I.	£192,331

Receipts for the week, this year, were £137,000 in bar silver from New York, £2,000 from Chile, £19,000 from the West Indies, and £6,000 from Australia; total, £164,000. Shipments were £103,000 in bar silver to Bombay and £35,000 to Calcutta; also £12,400 in Mexican dollars to Penang; total, £150,000.

Indian exchange continues firm, and the Council bills offered in London were all taken at an average of 15.97d. per rupee. Buying of silver for India showed some improvement.

Imports of gold at San Francisco in March were $99,023; of silver, $144,222. For the three months ending March 31 the imports were as follows:

	Gold.	Silver.	Total.
Coin	$16,420	.....	$16,420
Bullion	274,616	$358,896	633,512
Total	$291,036	$358,896	$649,932

Very nearly all the gold, and a large part of the silver, were imported in ores and base bullion.

Exports of gold and silver from San Francisco in March were very light—$11,404 gold and $107,444 silver. For the three months ending March 31 the exports were as follows:

	Gold.	Silver.	Total.
Coin	$23,124	$98,124	$121,248
Bullion	.....	533,400	533,400
Total	$23,124	$631,524	$654,648

There was this year a heavy decrease in shipments of silver to the East, chiefly to China.

The foreign merchandise trade of Great Britain for the three months ending March 31 is valued by the Board of Trade returns as follows:

	1902.	1903.
Imports	£132,694,250	£133,618,995
Exports	83,257,706	90,451,665
Excess, imports	£49,436,544	£43,167,330

The increase in imports was £924,745, or 0.7 per cent; the increase in exports, £7,193,959, or 7.9 per cent. The movement of gold and silver for the three months is reported as follows:

Gold:	1902.	1903.	Changes.	
Imports	£4,119,270	£6,693,885	I.	£2,574,615
Exports	2,825,792	3,678,112	I.	852,320
Excess, imports	£1,293,478	£3,015,773	I.	£1,722,295
Silver:				
Imports	2,270,369	2,464,071	I.	193,702
Exports	2,554,472	2,701,702	I.	147,230
Excess, exports	£284,103	£237,631	D.	£46,472

Of the silver imported this year £2,134,424, or 86.6 per cent of the total, is credited to the United States.

The foreign merchandise trade of France for the three months ending March 31 is valued by the Ministry of Commerce as below:

	1902.	1903.
Imports	Fr. 1,166,379,000	Fr. 1,209,152,000
Exports	994,078,000	1,049,694,000
Excess, imports	Fr. 172,301,000	Fr. 159,458,000

This shows an increase of 42,773,000 fr. in imports; an increase of 55,616,000 fr. in exports; and a decrease of 12,843,000 fr. in the excess of imports.

Prices of Foreign Coins.

	Bid.	Asked
Mexican dollars.....	$.42	$.44
Peruvian soles and Chilean pesos	.38	.40
Victoria sovereigns.....	4.85	4.88
Twenty francs.....	3.86	3.88
Twenty marks.....	4.74	4.80
Spanish 25 pesetas.....	4.78	4.82

OTHER METALS.

Daily Prices of Metals in New York.

April.	Sterling Exchange	N. Y. Cts.	Copper — London, Pence.	Copper — Lake, Cts. per lb.	Copper — Electrolytic, Cts per lb.	Copper — London, £ per ton.	Tin, Cts per lb.	Lead Cts. per lb.	Spelter — N. Y. Cts. per lb.	Spelter — St. L., Cts per lb.
23	4.87⅛	51½	23¾	14⅝ @14⅝	14⅜ @14⅝	61⅛	29¾	4.60 @4.65	5.60 @5.62½	5.40 @5.45
				14½	14⅜			4.60	5 60	5.40
24	4.87⅛	52⅜	24⅛	14⅜ @14⅝	14⅛ @14½	60⅛	29¾	@4.65	@5.62½	@5.45
				14½	14⅛			4.30	5 60	5.40
25	4.87⅛	53⅛	24½	14⅜ @14⅝	14⅛ @14½	....	30	@4.35	@5.62½	@5.45
				14½	14⅛			4.30	5 60	5.40
27	4.87¼	53¾	24⅛	14⅜ @14⅝	14⅛ @14½	59¾	30	@4.35	@5.65	@5.50
				14⅝	14⅜			4.30	5.60	5.40
28	4.87⅜	54⅜	24⅛	14⅜ @14⅝	14⅛ @14½	60	30	@4.35	@5.65	@5.50
				14⅜	14⅜			4.30	5.60	5.40
29	4.87⅛	53½	24⅛	@14⅜	@14⅝	60⅜	30	@4.35	@5.65	@5.50

London quotations are per Long Ton (2,240 lbs.) standard copper, which is now the equivalent of the former g. m. b's. The New York quotations for electrolytic copper are for cakes, ingots or wirebars; the price of electrolytic cathodes is usually 0.25c lower than these figures

Copper.—The continued weakness of the speculative market in London has exercised more or less of a depressing influence; both producers and consumers still assume a waiting attitude. Under the circumstances, the market is rather nominal. The ruling quotations are 14⅝@14¾c. for Lake; 14⅜@14⅝c. for electrolytic copper in ingots, cakes and wire bars; 14⅛@14⅜c. for cathodes; 14c. for casting copper.

The market for standard copper in London, which closed last Friday at £60 12s. 6d., opened on Monday at £59 7s. 6d., advanced on Tuesday to £60, and the closing quotations on Wednesday are cabled as £60 12s. 6d.@£60 15s. for spot; £60 12s. 6d.@£60 15s. for three months.

Refined and manufactured sorts we quote: English tough, £64@£65; best selected, £65@£65 10s.; strong sheets, £74@£75; India sheets, £71 10s.@£72 10s.; yellow metal, 6¼@6⅜d.

Exports and imports of copper at New York, Philadelphia and Baltimore in the week ending April 28, and for the year to date, are reported by our special correspondents as follows, in long tons:

Exports:	Week.	Year.
Austria	....	2,166
Belgium	....	686
France	100	7,936
Germany	1,455	8,011
Holland	825	14,207
Italy	100	980
United Kingdom	579	6,106
Other countries	418	1,959
Total copper	3,477	42,051
Matte	....	98
Imports:		
Copper	653	8,672
Matte	....	300

Exports and imports show an improvement this week. Of the imports 36 tons of copper were from Japan, the balance being from Great Britain and Mexico.

Imports of copper, in all forms, into Great Britain, with exports of the metal, are reported as follows for the three months ending March 31; the totals giving approximate contents of all material in fine copper. The figures are in long tons, of 2,240 lbs.:

	1902.	1903.	Changes.
Copper ore	26,988	20,160	D. 6,828
Matte and precipitate	22,420	17,708	D. 4,512
Fine copper	30,804	13,934	D. 16,870
Total imports, fine copper	44,713	24,804	D. 19,909
Exports	12,509	14,158	I. 1,649
Balance	32,204	10,646	D. 21,558

Of the imports this year 124 tons ore, 1,303 tons matte and 4,559 tons fine copper were from the United States; against 200 tons ore, 6,776 tons matte and 19,370 tons fine copper, in 1901.

Tin.—There has been a fair consumptive demand, but an utter lack of speculative orders. Prices have, therefore, moved within narrow limits. At the close we quote 30c. for spot, 29⅞c. for futures.

The foreign market, which closed last week at £137 7s. 6d., opened on Monday at £137 10s., advanced on Tuesday to £138, and the closing quotations on Wednesday are cabled as £137 5s.@£137 7s. 6d. for spot, £136 12s. 6d.@£136 15s. for three months.

The very strong tendency of the silver market has no doubt helped to sustain prices for tin.

Imports of tin into Great Britain, with re-exports of foreign tin, for the three months ending March 31, are reported as follows, in long tons of 2,240 lbs.:

	1902.	1903.	Changes.
Straits	5,761	5,007	D. 754
Australia	812	1,001	I. 189
Other countries	935	653	D. 282
Total imports	7,508	6,661	D. 847
Re-exports	5,190	6,242	I. 1,052
Balance	2,318	419	D. 1,899

It will be seen that the re-exports this year were very nearly as large as the imports, the balance being very small.

Lead.—The event of the week has been a reduction of 30c. for 100 lbs., in the prices quoted by the American Smelting and Refining Company, which was announced last Saturday. This step had become necessary in view of the fact that at the present low prices ruling for foreign lead, there was danger of foreign lead being imported, notwithstanding the duty of 2⅛c. The demand continues very satisfactory indeed. The closing quotations are 4.20@4.27½c., St. Louis; 4.30@4.35c., New York.

The foreign market has been rather flat, Spanish lead being quoted at £11 17s. 6d.@£11 18s. 9d.; English lead, £12@£12 1s. 3d.

Imports and exports of lead in Great Britain for the three months ending March 31 are reported as follows, in long tons, of 2,240 lbs.:

	1902.	1903.	Changes.
United States	14,423	9,367	D. 5,056
Spain	24,400	24,218	D. 182
Australia	16,762	16,295	D. 467
Other countries	3,213	5,170	I. 1,957
Total imports	58,798	55,050	D. 3,748
Exports	7,964	7,304	D. 660
Balance	50,834	47,746	D. 3,088

The lead credited to the United States is chiefly Mexican lead, refined here in bond.

Spanish Lead Market.—Messrs. Barrington & Holt report from Cartagena, Spain, under date of April 11, that the price of silver for the week has been 12.25 reales per ounce. The local quotation for pig lead on wharf has been 67 reales per quintal, which, at current exchange of 33.95 pesetas to £1, is equivalent to £11 1s. per ton of 2,240 lbs., f.o.b. Cartagena. Exports of pig lead have been 1,346,673 kgs. to Marseilles and 495,231 kgs. to London; a total of 1,841,904 kgs. There was also 1,074 kgs. silver bars shipped to Marsceilles.

Spelter.—Remains very strong indeed, although the business reported is nothing out of the ordinary. The ruling quotations are somewhat firmer, ranging from 5.40@5.50c., St. Louis; 5.60@5.65c., New York.

The foreign market is somewhat lower, good ordinaries being quoted at £22; specials, £22 5s.

Imports of spelter, or metallic zinc into Great Britain for the three months ending March 31 were 21,013 long tons, against 18,725 tons in the corresponding period of 1902; an increase of 2,288 tons, or 12.2 per cent. Imports of zinc in manufactured forms were 5,460 tons, against 5,956 tons in 1901; a decrease of 496 tons. These exports of manufactured zinc have not been reported separately heretofore.

Antimony.—Is dull and depressed. We quote: Cookson's, at 8¼c.; Hallett's, at 6¾@6⅞c.; Hungarian, French, Italian, United States and Japanese, at 6½c.

Nickel.—The price is quoted by leading producers at 40@47c. per lb. for large quantities down to ton lots, according to size and terms of order. The price for smaller lots, according to quantity, runs as high as 60c. per lb.

Platinum.—Consumption continues good, and prices are firm. Ingot platinum in large lots brings $19 per oz. in New York.

Chemical ware (crucibles and dishes), best hammered metal from store in large quantities, is worth 72½c. per gram.

Quicksilver.—The New York price is unchanged at $47.50 per flask for large lots, with a slightly higher figure quoted for small orders. The San Francisco quotation is still $44.50@$46 per flask for domestic orders, and $42@$43 for export. The London price is £8 12s. 6d. per flask, with the samme quotation asked by second hands.

Imports of quicksilver into Great Britain for the three months ending March 31 were 1,568,886 lbs., against 847,646 lbs. for the corresponding period in 1902. Re-exports were 443,160 lbs., against 525,785 lbs. in 1902. The balance consumed, or added to stocks, was 1,125,726 lbs., against 321,861 lbs. last year.

Minor Metals and Alloys.—Wholesale prices, f.o.b. works, are as follows:

Aluminum.	Per lb.		per lb.
No. 1, 99% ingots	33@37c.	Ferro-Tungsten (37%)	28c.
No. 2, 90% ingots	31@34c.	Magnesium	$2.75
Rolled Sheets	4c. up	Manganese, pure (N.Y.)	60c.
Alum-bronze	20@23c.	Mangan'e Cop. (20% Mn)	32c.
Nickel-alum	33@39c.	Mangan'e Cop. (30% Mn)	38c.
Bismuth	$2.10	Molybdenum (Best)	$1.82
Chromium, pure (N.Y.)	80c.	Phosphorus	45c.
Copper, red oxide	50c.	American	70c.
Ferro-Molyb'um (50%)	$1.25	Sodium metal	50c.
Ferro-Titanium (10%)	90c.	Tungsten (Best)	62c.
Ferro-Titanium (20@25%, N. Y.)	55c.		

Missouri Zinc Ore Market. April 25.

(From Our Special Correspondent.)

At least one lot of zinc ore was sold during the week at a price equivalent to an assay basis of $38.50 per ton, it being a bin of 63 per cent ore and the selling price was $41.50. Generally high-grade ores sold on a $38 basis, and other grades at less, according to quality. The purchasing agents of the Lanyon Zinc Commpany and the Prime Western Spelter Company announced simultaneously, the latter part of the week, that their buying price the coming week would be a $36 basis. It is believed by the ore producers that these companies have reached an understanding, and hope to lower the market by a concerted effort. It is now believed that it was to accomplish this end that each of these companies closed down three furnaces this month, instead of the excuse offered of impending labor trouble, as nothing of the kind has materialized. That these companies should shut down furnaces to accomplish this result does not speak very highly for the Western ore now on hand at the smelters, or else there is some other motive than price-cutting that actuated the movement, possibly an effort to limit the metal production. The car situation is now such that buyers can secure all the cars they want, though not altogether where they want them; but the shipments continue larger than an average, those of the past week being larger by 676 tons of zinc ore. Sales are now limited to the output of ore, all the ore reserve of the early spring having been moved.

Lead is selling in a few instances at $60, but the bulk brings $59.50 per ton. A year ago lead sold at $43.50, and one lot of zinc at $34 per ton, an advance of $16 for lead and $7.50 for zinc.

Following are the sales of zinc and lead from the various camps of the Joplin District for the week ending April 25, 1903:

	Zinc, lbs.	Lead, lbs.	Value.
Joplin	3,570,520	378,470	$79,264
Webb City & Carterville	1,630,600	559,840	45,866
Galena and Empire	968,850	94,910	20,648
Aurora	887,670	9,590	13,168
Duenweg	680,600	165,190	13,081
Oronogo	428,190	3,770	8,258
Zincite	490,690	7,370	6,117
Carthage	508,490	.....	6,112
Alba	484,230	10,030	6,107
Granby	286,000	36,000	4,734
Spurgeon and Spring City	196,140	35,880	4,401
Carl Junction	200,650	.....	4,013
Central City	205,850	13,410	3,898
Cave Spring	146,830	18,490	3,606
Prosperity	231,400	19,770	3,358
Reeds	193,080	.....	3,082
Diamond	110,440	.....	1,988
Badger	95,330	.....	2,050
Peoria, I. T.	.....	18,470	546
Total, the week	11,315,560	1,371,190	$230,297
Four months	161,403,910	18,463,890	$3,194,576

To-day ends four months of the year, and the total district value of the mineral marketed aggregates $3,194,576, a gain of $279,384 over last year. The total shipment to date is 80,702 tons of zinc ore, which sold at an average price of $33.25 per ton, and 9,232 tons of lead ore, at an average price of $55.20 per ton. For the same period of last year there was marketed 84,704 tons of zinc ore, selling at an average of $26.20, and 10,781 tons of lead ore, selling at an average of $43.10 per ton. The shipment this year is 4,003 tons of zinc and 1,549 tons of lead less than last year, but the higher prices give the increase in the district value.

Average Prices of Metals per lb., New York.

Month.	Tin. 1903.	Tin. 1902.	Lead. 1903.	Lead. 1902.	Spelter. 1903.	Spelter. 1902.
January	28.33	23.54	4.075	4.000	4.865	4.27
February	29.43	24.07	4.075	4.075	5.043	4.15
March	30.15	26.32	4.442	4.075	5.349	4.28
April	....	27.77	....	4.075	....	4.37
May	....	29.85	....	4.075	....	4.47
June	....	29.56	....	4.075	....	4.96
July	....	28.38	....	4.075	....	5.27
August	....	28.23	....	4.075	....	5.44
September	....	26.60	....	4.075	....	5.49
October	....	26.07	....	4.075	....	5.38
November	....	25.68	....	4.075	....	5.18
December	....	25.68	....	4.075	....	4.78
Year	....	26.79	....	4.069	....	4.84

Note.—The average price of spelter in St. Louis for the month of January, 1903, was 4.689c. per lb.; for February, 4.861c.; for March, 5.174c.

Average Prices of Copper.

Month.	New York Electrolytic. 1903.	New York Electrolytic. 1902.	New York Lake. 1903.	New York Lake. 1902.	London Standard. 1903.	London Standard. 1902.
January	12.159	11.053	12.361	11.322	53.52	48.43
February	12.778	12.173	12.901	12.378	57.34	55.16
March	14.416	11.882	14.572	12.188	63.85	53.39
April	.....	11.618	.....	11.986	....	52.79
May	.....	11.856	.....	12.226	....	54.03
June	.....	12.110	.....	12.360	....	53.93
July	.....	11.771	.....	11.923	....	52.89
August	.....	11.404	.....	11.649	....	51.96
September	.....	11.480	.....	11.760	....	52.68
October	.....	11.449	.....	11.722	....	52.18
November	.....	11.288	.....	11.533	....	51.08
December	.....	11.430	.....	11.599	....	50.96
Year	.....	11.626	.....	11.887	....	52.98

New York prices are in cents, per pound; London prices in pounds sterling, per long ton of 2,240 lbs., standard copper. The prices for electrolytic copper are for cakes, ingots or wire bars; prices of cathodes are usually 0.25 cent lower.

Average Prices of Silver, per ounce Troy.

Month.	1903. London. Pence.	1903. N. Y. Cents.	1902. London. Pence.	1902. N. Y. Cents.	1901. London. Pence.	1901. N. Y. Cents.
January	21.98	47.57	25.62	55.56	28.97	62.82
February	22.11	47.89	25.41	55.09	28.13	61.06
March	22.49	48.72	25.00	54.23	27.04	60.63
April	....	....	24.34	52.72	27.30	59.29
May	....	....	23.71	51.31	27.43	59.64
June	....	....	24.17	52.36	27.42	59.57
July	....	....	24.38	52.88	26.96	58.46
August	....	....	24.23	52.52	26.94	58.37
September	....	....	23.88	51.52	26.93	58.26
October	....	....	23.40	50.57	26.62	57.59
November	....	....	22.70	49.07	26.12	56.64
December	....	....	22.21	48.03	25.46	55.10
Year	....	....	24.09	52.16	27.11	58.95

The New York prices are per fine ounce; the London quotation is per standard ounce, .925 fine.

ASSESSMENTS.

Name of Company.	Location.	No.	Delinq.	Sale.	Amt.
Caledonia	Nev.	..	Apr. 15	May 4	.15
Century	Utah	..	Apr. 19	May 18	.10
Champion	Cal.	..	May 16	.....	.25
Challar	Nev.	62	May 21	June 11	.10
Confidence	Nev.	39	May 19	June 8	.20
Gould & Curry	Nev.	..	Apr. 17	May 6	.15
Grizzly	Cal.	..	May 25	.....	.10
Hale & Norcross	Nev.	12	Apr. 30	May 28	.10
Kentucky Con.	Nev.	..	May 6	May 29	.05
Maple	Utah	8	Apr. 20	May 8	.00⅛
Maple Grove	Cal.	..	May 4	.....	.001
Morning Star	Nev.	..	May 1	May 21	.00½
National Con.	Cal.	17	May 4	May 30	.05
New Independence	Cal.	..	May 4	.....	.02
New Montezuma	Cal.	..	May 16	.....	.02
Potosi	Nev.	66	May 14	June 4	.10
Provident Oil	Cal.	..	May 7	.....	.03½
Santa Cruz Lime	Cal.	..	May 4	May 25	75.00
Seg. Belcher & Mides	Nev.	..	May 5	May 25	.05
Sierra Nevada	Nev.	..	May 19	June 8	.10
Silver Shield	Utah	4	Apr. 28	May 15	.02
Sonora	Mex.	..	May 6	.....	.01
Ultimo	Cal.	..	Apr. 30	.....	.16
Wabash	Utah	2	Apr. 21	May 14	.05
William Tell Con.	Cal.	..	May 9	.....	.001½
Yellow Jacket	Nev.	..	Apr. 30	June 5	.15

DIVIDENDS.

Name of Company.	Date.	Per Share.	Total.	Total to Date.
†Amalgamated Copper	May 25	.50	$769,430	$21,195,540
*Con. Mercur., Utah	May 9	.03	30,000	1,000,000
*Esperanza, Mex.	May 1	3.95	11,850	1,116,099
*Imperial Oil, Cal.	May 6	.20	20,000	360,000
International Nickel, pf.,	May 26	4.00	360,000	360,000
Pittsburg Oil, Cal.	May 1	.02½	6,000	12,000
Quicksilver, pf., Cal.	May 8	.50	21,500	1,931,411
Shelby Iron	May 15	10.00	10,000	700,000
*Thirty-Three Oil, Cal.	May 6	.10	10,000	170,000
†U. S. Steel, common	June 9	1.00	5,083,025	45,726,552
†U. S. Steel, pf.	May 15	1.75	8,929,919	80,332,910

* Monthly. † Quarterly.

STOCK QUOTATIONS.

NEW YORK.

Company and Location.	par val	Apr. 22 H.	Apr. 22 L.	Apr. 23 H.	Apr. 23 L.	Apr. 24. H.	Apr. 24. L.	Apr. 25. H.	Apr. 25. L.	Apr. 27 H.	Apr. 27 L.	Apr. 28. H	Apr. 28. L.	Sales
Alice, Mont.	$25			.23										55
Amalgamated c., Mont	100			66¾	65	65	63⅞	64	63½	63½	62⅜	64⅝	62⅛	106695
†Anaconda c. Mont.	25			108½	108	106¾	104			104	102	103	102	2,000
Anaconda Gold, Colo.	5			.14										500
Bullion, Nev.	1	.11												600
Chollar, Nev.	3	.27		.27		.25				.26	.2			9,000
Chrysolite, Colo.	50	.07												500
C. K. & N., Colo.	1					.20						.22		2,000
Comstock T., s., Nev.	3			.07½								.07		3,000
Comst T. Bonds	100	.07½		.07½										5,000
Con. Cal. & Va., g. s.	2½			1 55		1.45						1.45		700
Creede & C. C., Colo.	1	.02												1,000
Cripple Creek c., Colo.	1			.04½						.05				1,500
Daly, Utah	20					1.75								200
Dunkin, Colo.	1									.10				400
Elkton g., Colo.	1			.39		.39						.40		
El Paso, Colo.	1			.60								.63		
Gold Dollar, Colo.	1	.05⅝												1,0 0
Gould & Curry, Nev.	3	.40												200
Greene Con., c., Mex.	10			24½	23⅜	23¾	23⅝			23⅞	23⅜	23½	23⅜	7,540
Hale & Norcross	3											.75		300
Iron Silver	20									1.60				150
Isabella, g., Colo.	1	.18		.18		.19	17			.17½				2,330
Jack Pot, Colo	1											.10		1,000
King & Pembroke, Ont	10	.10												100
Mexican, Nev	3			1.00										200
Mollie Gibson, Colo.	5									.08	.07½	.08		2,100
Moon-Anchor, Colo.	5					.08				.08				800
Occidental, Nev.	)					.40								400
Ontario, Utah	100	6								6	5⅝	6¼		780
Ophir, s., Nev	1	1.80		1.60		1.45						1.60	1.55	800
Pharmacist, Colo.	1	.03½								.03½				2,000
Portland, Colo.	10			1.42								1.45		500
Potosi, Nev.	3					.25	.18½			.18		.19		3,100
Quicksilver, Cal.	10					1.75								100
Quicksilver, Cal., pf.	100											7.25		100
Sierra Nevada, Nev.	3													
Silver Hill, Nev	1	.85				.89								600
Standard, Cal.	10											3.00		15
Tenn. c., Tenn	25			29⅜	29⅝	29¼	29½	30	29¾	29¼	28¾	28⅛	28¼	3,100
Union Con., Nev.	2½			93		.90								200
Union Cop., N. C.	10			2⅜		2⅜		2¼		2¼	2⅛	2⅛		3,125
Utah Con., Nev.	1									.40				400
Virginia M., Colo.	1													
White Knob. g. s., Ida	100			13½						13½		13		270

† Ex-Dividend. Total sales 158,360 shares.

BOSTON, MASS.*

Name of Company.	par val	Shares listed.	Apr. 22. H.	Apr. 22. L.	Apr. 23. H.	Apr. 23. L.	Apr. 24 H.	Apr. 24 L.	Ap. 25 H.	Ap. 25 L.	Apr. 27. H	Apr. 27. L.	Apr. 28. H.	Apr. 28. L.	Sales
Adventure Con., c.	$25	100,000	9½	9⅛	9⅝		9½						9¾	9¼	310
Aetna	5	10),000			.75								.75		200
Allouez	25	80,000	7⅛	6⅝	7¼	6⅛	6¾						6¾	6⅝	5,240
Amalgamated, c.	100	1,538,879	66¾	66	66⅛	64⅞	65½	63¾					64⅝	63	27,849
Am. Z. L. & Sm.	25	60,000													
Anaconda, c.	25	1,200,000			27		27	25							120
Arcadian, c.	25	150,000					4								365
Arnold	25	60,000													
Atlantic, c.	25	100,000					12¾	12½					12		195
Bingham Con., g. s.	50	150,000	32⅜	32⅛	32⅝	31⅝	32	31½					31	30½	1,382
Bonanza	10	300,000													
Cal. & Hecla, c.	25	100,000	525	522	525		525								
Centennial, c.	25	90,000	27¼	25¾	28¼	26½	26½	25					25¾	24	7,489
Central Oil	25	60,000	6¼												400
Con. Mercur, g.	5	1,000,000	1 1/16	1¼	1 1/32	1⅛	1⅛	1 1/32					1⅛	1 1/32	9,560
Continental Zinc	25	22,000													1,040
Copper Range Con.	100	285,000	67¼	66	67⅜	65¼	65⅝	64					64	62	15,925
Daly-West., g. s.	20	180,000			43½	43¼	44	43½					43	47½	1,281
Dominion Coal.	100	150,000	110½	108	111⅛	110½	110½	103					106	104	6,145
Dominion Coal, pf.	100	30,000											117¼		8
Dominion I & S.	100	100,000	32¼	28¾	31⅜	29¼	28½	27¼					28	27¼	13,655
Elm River	12	100,000	4¼	4	4¼	4	4⅛						4		2,875
Franklin, c.	25	100,000	11¼	11	11										265
Granby			5½	4¾	5¼	4⅞	5 1/16	5					5⅛	5	4,395
Guanajuato, Con.	5	385,000	2⅜	2	2⅜	2									1,545
Isle Royale Con., c.	25	385,000					12								200
Mass Con., c.	25	100,000	†10½	10			†10	9¾							160
Mayflower, c.	25	100,000													
Michigan, c.	25	100,000	9										8¼		400
Mohawk, c.	25	100,000	54	53½	53⅛	53⅛	52⅝	52					51	50¼	1,887
Mont. Coal & Coke	25	200,000											6½		50
Mont'l & Boston, c.	5	570,000	2¼	2	2⅜	2⅛	2¼	2¼					1		2,035
National.	7	100,000													400
New Idria, g.	5	100,000			9										30
Old Colony, c.	25	100,000			1¼										530
Old Dominion, c.	25	150,000			18¼		18						17		355
Osceola, c.	25	98,150	68		69	68	67½	67					65½	65	927
Parrot, s. c.	10	229,850			29	28¾	28¼						27½	27	895
Phoenix Con., c.	25	100,000	5		5		5						5		1,015
Quincy, c.	25	100,000			118		5						115		298
Rhode Island, c.	25	100,000			2¼		2½								150
Santa Fe, g. s.	10	250,000			2¼	2¼									410
Shannon, c.	10	181,248	14⅞	14⅜	14⅞	14⅜	14½	14¼					14¼	13⅜	5,060
Tamarack, c.	25	60,000	145		150		148								35
Tecumseh	25	40,000													
Tremountain	25	100,000	94	92½	92½		90						91		395
Trinity, c.	25	160,000	9¾	9⅝	10		10	9¼					9¼	8⅞	1,685
United Copper	100	450,000													100
United States, g.	25	419,000	25⅛	25	25⅛	24⅜	24¾	24¼					24⅜	24⅛	5,246
U. S. Coal & Oil.	25	240,000	15	14⅜	15	14⅞	14¾	14⅜					14¾	14	1,617
Utah Con., g.	5	300,000	29¾	29¼	29⅜	29	29	28¼					29½	29	4,940
Victoria, c.	25	100,000	6¼				6	5½					5 5/16		510
Washington	25	60,000				25									200
Winona, c.	25	100,000	‡125⅝	11¼	12⅜	11¼	‡11¼	10¼					11	10¼	7,897
Wolverine, c.	25	60,000	73		73		72	71					71	70	685
Wyandot	25	100,000	2¼	2	2⅛	2	2								785

* Boston Stock Exchange. † Ex Dividend. ** Ex-Rights. ‡ Assessment Paid. Total sales, 139,279 shares.

COAL, IRON AND INDUSTRIAL STOCKS.*

Name of Company.	Par val	Apr. 22. H.	Apr. 22. L.	Apr. 23. H.	Apr. 23. L.	Apr. 24. H.	Apr. 24. L.	Apr 25. H.	Apr 25. L.	Apr. 27. H.	Apr. 27. L.	Apr. 28. H.	Apr. 28. L.	Sale
Allis-Chalmers, U. S.	100			16										110
Allis-Chalm's, pf. U.S.	100													
Am. Agr. Chem., U.S.	100													
Am. Agr. Chem. pf. U.S.	100													
Am. Sm. & Ref., U.S.	100			51½	50¾	51⅞	50⅓					51⅛	51	
Am. Sm. & Ref. pf. U.S.	100			95⅛		95½	95					95⅝	95	
Am. Steel & Fdy., U.S.	100			16⅞	16½	16⅝	16					15⅛	16	
Am. S. & Fdy. pf., U.S.	100			60										
Col. Fuel & I., Colo.	100			65¼	64	64¼	63⅞					65⅜	64¼	
Col. & H. C. & I., Colo.	100			20⅜	20¼									
†Crucible Steel, U. S.	100			18½		18¾	18½							
†Crucible Steel, pf, U S	100			83¾	83	83¼	83⅛					83½	83¼	
† Mong. R. Coal, Pa.	100			10⅛										
† Mong. R. Coal pf, Pa	100			39½		39⅝	39½					39¾	39⅝	
National Lead, U.S.	100			24½										
National Lead pf, U.S.	100													
† Phila Nat. Gas	100			45								45		
† Phila Nat. Gas, pf	100													
† Pittsburg Coal, Pa.	100			29¼		29¼	28½					29¾		
† Pittsburg Coal pf, Pa	100			39½	33¼	89						80		
Republic I. & S., U.S.	100			20	19⅝	19½						19½		
Republic I. & S., pf, U.S.	100					78¾								
Sloss-Shef S. & I., Ala.	100			64¾	63	61						61	60¾	
Sloss-Sheff S. & I. pf, Ala.	100													
Standard Oil, U.S.	100			670	665	667½	663					670	665	
Tenn. C. I. & R. R., Ala.	100			66⅜	65¼	65¼	64⅞					65¾	65	
U. S. Red & Ref., U. S.	100													
U.S. Red & R. pf., U.S.	100													
U.S. Steel Corp., U.S.	100			36¼	35⅜	36½	35⅞					35⅞	35⅝	
U.S. Steel Corp. pf, U.S.	100			87⅜	87	87½	87					‡85½	84⅜	
Va.-Car Chem., U.S.	100			63	62¼	63½	62½					63⅞	63½	
Va.-Car Chem. pf, U.S.	100													
Va. I. C. & Coke, U. S.	100			34										

* New York Stock Exchange. † Pittsburg Stock Exchange. ‡Ex-Dividend. Total sales, 114,961 shares.

COLORADO SPRINGS, COLO.*

Name of Company.	Par val	Apr. 20. H.	Apr. 20. L.	Apr. 21. H.	Apr. 21. L.	Apr. 22. H.	Apr. 22. L.	Apr. 23. H.	Apr. 23. L.	Apr. 24. H.	Apr. 24. L.	Apr. 25. H.	Apr. 25. L.	Sales
Acacia	$1	.09¼	.08¾	.09¼	.08¼					.09		.09	.08¾	1,000
Am. Con.	1	.02⅞	.02⅜	.02⅛	.02⅜					.02⅜	.02¾	.02⅜	.02⅜	1,000
Anaconda	1	.14¾	.13½	.15	.13½					.14¼	.13⅜	.14		
Ben Hur	1		.02¼	.02¼						.02¼	.02⅛	.02⅜	.02	7,000
Blue Bell	1		.04		.04						.05	.07	.05½	
C. C. & M.	1	.02⅜	.02¼	.02⅜	.02⅛					.02⅛	.02¼	.02¼	.02⅜	
C. K. & N.	1	.19		.19⅜	.18⅜					.05	.04⅜			3,000
C. C. Con.	1	.06	.04½	.05¼	.04½					.04⅜		.04¾	.04	
Coriolanus	1	.04		.04						.20	.19	.03½		
Des Moines	1	.03½	.02	.04	.02						.02	.04	.02	
Dr. Jack Pot	1	.08¾		.08½	.08¼					.08½		.08½	.08½	2,000
Elkton Con.	1	.37½	.37	.38	.37					.37		.36¼	.36	12,100
El Paso	1	.60	.58½	.59¾	.58½					.59¾	.58½	.59		5,500
Fannie Rawlings	1	.05	.03	.03½						.03½	.03½	.04¾	.03½	
Findley	1	.16½	.16⅜	.16	.15¼					.15		.15	.14½	7,000
Gold King	1													
Gold Dollar Con.	1	.05⅜	.05¼	.05⅜	.05¼					.05⅝	.05⅜	.05⅜		63,000
Golden Cycle	1	.73½		.73⅜						.74	.73½	.74¼	.73	5,700
Golden Fleece	1	.11	.05	.11	.05					.11	.05	.11	.05	
Gould	1	.03		.03	.02¾					.03		.16¾	.16¼	6,000
Hart	1		.02		.02						.02		.02	
Isabella	1	.16		.16¼	.16					.16⅛	.15⅜	.16⅜	.16¼	11,500
Jack Pot	1	.09		.09						.09		.09		
Last Dollar	1	.04¾		.04⅞	.04⅝					.50		.50		
Lexington	1	.07	.05	.07	.06					.04½		.04¾	.04¾	3,000
Little Puck	1	.03¾	.03⅛	.03⅞	.03⅝					.03¾	.03	.03¾	.03	2,000
Mollie Gibson	1	.07	.05	.07	.06					.06⅛	.06	.06⅜	.05½	
Moon Anchor	1	.04⅝	.04⅜	.08½	.08					.08	.07¾	.08	.07⅝	
New Haven	1	.02¾	.02⅛	.03	.02½					.02⅝	.02⅛	.02¼		8,000
Pharmacist	1	.04⅜	.04⅛	.04¼	.04¾					.04⅜	.04⅛	.04⅛	.04⅜	3,000
Pinnacle	1	.04½	.04	.04⅜	.04¾					.04½	.04	.04⅝	.04¼	
Pointer	1													
Portland	1	1.38		1.38½	1.36½					1 40¼	1.39	1 45	1.38	6,700
Prince Albert	1	.03		.03	.02½					.03	.02½	.03	.02⅝	8,000
Vindicator	1	.95	.90	.94¼	.90					.95	.88	.93	.89	1,500
Work	1	.06¾	.06¾	.07	.06¾					.07	.06¾	.07	.06¾	7,500

*Colo. Springs Mining Stock Exchange. All mines are in Colorado. Total sales 103,000 shares.

COLORADO SPRINGS. (*By Telegraph.*)

Name of Company.	Apr. 27. H.	Apr. 27. L.	Apr. 28. H.	Apr. 28. L.	Name of Company.	Apr. 27. H.	Apr. 27. L.	Apr. 28. H.	Apr. 28. L.
Acacia	.09	.08¾	.09	.08¾	Golden Cycle	.11	.05	.11	.05
Am. Con	.02⅞	.02⅜	.03	.02¾	Golden Fleece	.16¾	.16	.17	.16¾
Anaconda	.18	.14	.18	.14	Isabella	.09	.08	.09	.08
Cripple Creek Con	.05	.04¾	.04¾	.04½	Jack Pot	.50	.20	.50	.20
C. K. & N	.20	.19¾	.18¾	.18½	Last Dollar	.07	.05½	.06½	.05½
Doctor Jack Pot	.08¾	.08¼	.08½	.08¼	Mollie Gibson	.08¼	.07½	.08½	.07½
Elkton, Con	.37¼	.36½	.38	.36⅜	Moon Anchor	.04¾	.04	.04¾	.04
El Paso	.59⅜	.58¾	.60	.59	Pharmacist	1.40	1.38	1.40	1.38
Findley	.15¼	.15	.15¼	.14⅜	Portland	.07	.06¾	.07	.06¾
Gold Dollar Con	.05⅞	.05	.05¾	.05¼	Work				

STOCK QUOTATIONS.

MEXICO*. April 25.

Name of Company	Shares Issued.	Last div'd	Prices. Bid.	Ask.
Durango.				
Ca. Min. de Penoles	2,500	$50.00	$4,000	$4,500
San Andres de la Sierra	200	.....	1,000	.....
Guanajuato.				
Angustias, Pozos	2,400	5.00	80	90
Cinco Senores y An., aviadoras	2,000	15.00	190	195
Cinco Senores y An., aviada	400	10.00	165	175
Providencia, San Juan de la Luz	6,000	2.00	140	145
Queensland y Australia	300	.....	85	90
Guerrero				
Garduno y Anexas	7,200	.....	35	60
Hidalgo.				
Amistad y Concordia	9,000	5.30	76	77
Carmen, aviada	1,100	.....	115	125
Guadalupe Fresnillo mill	1,000	.....	250	300
Guadalupe Fresnillo Mine	1,400	.....	70	80
La Blanca, aviadors	1,530	.....	1,100	1,170
La Blanca, aviada	768	.....	880	900
La Reina y An., aviadora	5,600	.....	21	23
Maravillas y An., aviador	1,680	.....	.....	.....
Maravillas el Lobo	1,000	.....	13	180
Palma y An., aviador	1,800	.....	.....	12
Real del Monte	2,554	10 00	650	700
Santa Ana y An., aviadora	1,800	.....	30	35
Santa Anay An ,aviada	600	.....	25	30
Sta. Gertrudis y An., aviadas	9,600	.....	.....	7½
Sta. Gertrudis y An., aviadora	28,800	2 00	80	81
Santo Tomas Apostol aviadoras	5,130	.....	1	2
San Felipe de Jesus, aviadora	3,600	.....	30	33
San Felipe de Jesus, aviada	1,200	.....	10	.....
San Rafael y An., Trompillo	1,200	12.00	1,100	1,640
San Rafael y An., aviada	1,200	$8.00	$115	$420
Soledad, aviada	960	8.00	370	380
Sorpresa, aviada	960	5.00	310	325
Mexico.				
Alacran	2,400	.....	30	40
Buen Despacho	3,000	.....	70	75
Dos Estrellas	3,000	30.00	2,170	2,190
La Esperanza (El Oro)	3,000	10.00	1,170	1,190
La Reformia, aviadores	2,000	.....	55	57
Santa Ana, Esperanza	2,400	.....	70	96
Michoacan.				
Luz de Borda, aviadora	3,000	.....	40	50
Luz de Borda, aviada	1,000	.....	10	14
San Luis Potosi.				
Concepcion y An	3,000	.....	120	130
El Barreno, aviadora	2,000	2.00	40	43
Sta. Maria de la Paz	2,400	10.00	.....	.....
San Diego y Annexas	2,400	4.00	22	25
Zacatecas.				
Asturiana y An	2,500	.....	35	60
Candelaria y Pinos	2,500	10.00	240	260
Esperanza y An	2,400	.....	25	35
Lourdes	2 500	.....	30	40
Luz de Minillas, pagadoras	2,000	.....	20	30
San Carlos y Annexas	2,500	20.00	150	170
Sta. Maria de Gaud.	2,500	10.00	55	65
Miscellaneous.				
Bartolome de Medina	2,000	1.50	70	75
Guadalupe Hacienda	10,000	6.00	.....	.....
La Luz Hac. (Pachuca)	3,750	.....	300	355
La Reina (Chihuahua)	192	.....	.....	.....
Naica (Chihuahua)	100	.....	6,000	.....
Natividad (Oaxaca) aviadora	1,800	8.00	700	900
Natividad (Oaxaca) aviadas	600	4.00	700	900
San Francisco Hac	6,000	1.00	50	55
Santa Ana Huantla Morelos	4,000	.....	.....	.....
Union Hacienda	3,000	5.00	240	260

*Values are in Mexican currency.

SAN FRANCISCO (*By Telegraph*).

Name of Company.	April. 27.	28.	Name of Company.	April. 27.	28.
Belcher	.49	.49	Justice	.10	.09
Best & Belcher	1.50	1.50	Mexican	.97	.93
Caledonia	2.05	2.05	Occidental Con	.40	.40
Challenge Con	.43	.43	Ophir	1.55	1.55
Chollar	.23	.23	Overman	.45	.47
Confidence	1.00	1.10	Potosi	.20	.20
Con. Cal. & Va	1.35	1.25	Savage	.20	.20
Con. Imperial	.02	.02	Sierra Nevada	.71	.29
Crown Point	.26	.24	Union Con	.87	.82
Gould & Curry	.38	.38	Utah Con	.42	.43
Hale & Norcross	.73	.71	Yellow Jacket	.41	.40

SALT LAKE CITY.* Apr. 24.

Name of Company	Shares.	Par Val	High	Low	Sales.
Ajax	.....	.....	.24	.24	100
Ben Butler	.....	.....	.03½	.02	3,500
California	300,000	$1	.10½	.15	1,734
Carisa	500,000	1	.14	.13½	3,100
Century	150,000	1	.64	.47½	500
Con. Mercur	1,000,000	5	1.50½	1.44½	7,016
Daly	.....	.....	2 25	2.20	300
Daly-Judge	300,000	1	9.40	9.20	2,195
Daly-West	180,000	20	43.75	42.80	940
E. & B. Pencil	.....	.....	1.04	.93½	6,150
Grand Central	250 000	1	5.23½	5.05	1,630
L. Mammoth	150,000	1	.56½	.51	12,400
La Reine	.....	.....	.05	.05	2,800
Mammoth	.....	.....	1.36	1.35	300
May Day	.....	.....	.16	.14½	19,200
M. Washington	.....	.....	.03½	.02½	27,000
N. Y. Bonanza	.....	.....	21	20	10,000
Ontario	.....	.....	5 70	5.70	100
Sacramento	1,000,000	5	24½	23¾	20,100
Star Con	500,000	1	.15½	.14½	3,600
S. Swansea	.....	.....	20½	.18½	6,200
Uncle Sam	.....	.....	20¾	.20	5,500
Utah	.....	.....	.75½	.75	500
Victor	500,000	1	.26	.22	1,826
Wabash	.....	.....	.30	.22	29,550
Yankee Con	500,000	1	.35	.34½	2,600

All mines are in Utah. *By our Special Correspondent. Total sales, 168,311 shares.

ST. LOUIS, MO.* Apr. 25.

Name.	Capital Stock.	Par Val.	Prices. Bid.	Ask.
Am.-Nettie, Colo	$3,000,000	$10	$0.50	$0.70
Catherine Lead, Mo.	500,000	10	1.80	3.00
Central Coal & C	1,875,000	100	64.50	65.50
Central C. & C., pf.	1,875 000	100	74 80	76 00
Central Lead, Mo	1,000,000	10	130 00	140.00
Columbia Lead, Mo.	$500,000	10	$11.00	12.50
Con. Coal, Ill.	500,000	100	21.75	22.00
Doe Run Lead Co.	1,500,000	100	105.00	110.00
Granite Bimet., Mt.	1,000,000	10	0 78	0.86
St Joe Lead, Mo.	6,000,000	10	16 00	17.00

*From our Special Correspondent.

PHILADELPHIA, PA.*

Name and Location of Company.	par val	Apr. 22. H.	L.	Apr. 23. H.	L.	Apr. 24. H.	L.	Apr. . H.	L.	Apr. 27. H.	L.	Apr. 28 H.	L.	Sales
Am. Alkali, Mich	$50	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Am. Cement	10	8	.....	8	.....	8	.....	.....	.....	8	.....	.....	.....	375
Cambria Iron, Pa	50	47	.....	.....	.....	.....	.....	.....	.....	.....	.....	47½	.....	255
Cambria Steel, Pa	50	24¾	.....	24⅞	24¾	.....	.....	24¼	24¼	24¾	.....	24½	.....	1,065
Penn. Steel, pfd	100	.....	.....	93	.....	.....	.....	91½	.....	92	.....	.....	.....	40
Susq. I. & S., Pa	5	.....	.....	2 3/16	.....	2 3/16	.....	2 3/16	.....	2 3/16	.....	2¼	2¼	325
United Gas I., Pa	50	108½	103¾	108⅝	108	108¾	108	108¾	107⅞	108¾	107¾	107¾	107½	2,780
Warwick I. & Steel	10	.....	.....	.....	.....	5 15/16	.....	.....	.....	.....	.....	.....	.....	50

*Reported by Townsend, Whelen & Co., 309 Walnut St., Philadelphia, Pa. Total sales 5,160 shares.

LONDON. April 18.

Name and Country of Company	Shares Issued.	Par value.	Latest dividend. Amt.	Date	Quotations. Buyers.	Sellers.
		£. s. d.	s. d.		£ s. d.	£ s. d.
Alaska-Treadwell, g., Alaska	200,000	5 0 0	3 0	Apr., 1903	4 7 6	4 12 6
Anaconda, c. s., Montana	1,200,000	5 0 0	2 0	May, 1903	5 10 0	5 12 6
Arizona, c., Def., ord	63,444	1 0 0	5 6	Feb., 1903	7 15 0	8 5 0
Arizona, pref., ord	316,340	1 0 0	5 6	Feb., 1903	8 0 0	8 5 0
Camp Bird, g., Colorado	738,000	1 0 0	0 7½	Mar., 1903	1 15 0	1 15 6
Copiapo, c., Chile	142,500	2 0 0	6 10½	Mar., 1903	2 5 0	2 10 0
De Lamar, g. s., Idaho	80,000	1 0 0	2 0	Nov., 1902	13 3	13 9
Enterprise, g., British Col	165,000	1 0 0			3 6	7 6
El Oro, g., Mexico	1,000,000	1 0 0	1 6	Dec., 1902	1 11 3	1 13 9
Frontino & Bolivia, g., Colombia	128,682	1 0 0	3 0	July, 1901	17 6	1 0 0
Le Roi, g., British Col	200,000	5 0 0	5 0	Nov., 1899	1 8 9	1 11 3
Le Roi No. 2, g., British Col	120,000	5 0 0	5 0	May, 1902	17 6	1 0 0
Mesquital, Mexico	250,000	2 0	3	Feb., 1903	4 0	5 0
Montana, g. s., Montana	657,128	1 0 0	6	April, 1899	2 3	2 5
Mountain c., Cal	250,000	5 0 0	4 0	Nov., 1902	3 5 0	3 10 0
Stratton's Independence, Colorado	1,000,667	1 0 0	6	April, 1902	9 6	10 0
St. John del Rey, g., Brazil	546,265	1 0 0	6	Dec., 1902	16 6	17 6
Utah Con., g. c., (Highland Boy), Utah	300,000	1 0 0	7 0	Jan., 1903	5 10 0	6 0 0
Ymir, g., British Col	200,000	1 0 0	1 0	Mar., 1902	8 9	11 3
European:						
Linares, l., Spain	15,000	3 0 0	9	Oct., 1902	3 15 0	4 5 0
Mason & Barry, c., sul., Port'g'l	185,172	1 0 0	11 0	May, 1903	3 17 6	4 2 6
Rio Tinto, c., Spain	325,000	5 0 0	27 6	Apr., 1903	50 2 6	50 7 6
Rio Tinto, pref., Spain	325,000	5 0 0	2 6	Apr., 1903	6 0 0	6 5 0
Tharsis, c., Spain	625,000	2 0 0	6 0	Apr., 1903	4 7 6	4 12 6
Australia and New Zealand:						
Assoc. Gold Mines, W. Australia	495,348	1 0 0	1 6	Jan., 1900	2 0 0	2 2 6
Briseis, Tin, Tasmania	600,000	1 0 0			7 6	8 6
Broken Hill Pr'p., s., N. S. Wales	980,000	8 0	1 0	Feb., 1903	1 14 6	1 15 6
Cosmopolitan Prop., W. Australia	385,000	1 0 0	6	July, 1902	17 6	18 0
Golden Horse Shoe, W. Australia	300,000	5 0 0	6 0	Apr., 1903	7 6	7 9
Great Fingall Con., W. Australia	250,000	1 0 0	5 0	Sept., 1902	7 11 3	7 13 9
Great Bod'r Pr'p., W. Australia	1,750,000	2 0	6	Mar., 1903	1 2 3	1 2 9
Ivanhoe Gold Corp., W. Australia	200,000	5 0 0	4 0	Jan., 1903	9 12 6	9 15 0
Kalgurli, g., W. Australia	120,000	1 0 0	2 6	Apr., 1903	4 6 3	4 8 0
Lake View Cons., g., W. Australia	250,000	1 0 0	rts.	Aug., 1902	2 17 3	2 18 9
Mt. Lyell M. & R. I., c., Tasmania	275,000	3 0 0	1 0	Apr., 1903	2 17 6	3 0 0
Mt. Morgan, g., Queensland	1,000,000	1 0 0	3	Mar., 1903	4 0 0	4 5 0
Waihi, g., New Zealand	497,412	1 0 0	2 6	Mar., 1903	5 1 3	5 3 9
Indian:						
Champion Reef, g., Colar Fields	473,000	10 0	4 6	May., 1903	7 7 6	7 10 0
Mysore Gold, Colar Fields	530,000	10 0	5 0	Mar., 1903	7 1 3	7 3 9
Nundydroog, g., Colar Fields	484,000	10 0	1 6	Mar., 1903	2 6 3	2 8 9
Ooregum, g., Colar Fields	343,000	10 0	1 6	Apr., 1903	1 15 0	1 17 6
Ooregum, pref., g., Colar Fields	240,000	10 0	1 6	Apr., 1903	2 5 0	2 7 6
African:						
Angelo, g, Transvaal	600,000	1 0 0	6 0	Feb., 1903	7 3 9	7 6 3
Bonanza, g., Transvaal	200,000	1 0 0	12 0	Feb., 1903	4 0 0	4 2 6
British South Africa	4,436,010	1 0 0	rts.	May, 1899	3 1 3	3 3 9
Cape Copper, S. Africa	300,000	2 0 0	8 0	Jan., 1902	2 17 6	3 0 0
Cape Copper, pref., S. Africa	75,000	2 0 0	2 3	Jan., 1903	2 18 9	3 1 3
City and Sub'n (New), g., Transvaal	340,000	4 0 0	8 0	Aug., 1899	6 7 6	6 12 6
Crown Reef, g., Transvaal	120,000	1 0 0	11 0	May., 1903	17 10 0	18 10 0
De Beers Con., d., pref., Cape Colony	800,000	2 10 0	10 0	Mar., 1903	19 8 9	19 11 3
De Beers Con., def	1,000,000	2 10 0	12 6	Mar., 1903	22 0 0	22 2 6
East Rand, Prop., Transvaal	970,000	1 0 0	rts.	May, 1902	8 3 9	8 5 0
Ferreira g., Transvaal	90,000	1 0 0	2 0	May., 1903	22 5 0	22 15 0
Geldenhuis Est., g., Transvaal	200,000	1 0 0	5 0	Feb., 1903	6 13 9	6 16 3
Geduld, g , Transvaal	400,000	1 0 0	rts.	Mar., 1902	7 16 8	7 18 9
Henry Nourse, g., Transvaal	125,000	1 0 0	8 0	Feb., 1903	9 5 0	9 10 0
Jagersfontein, d., Orange F. S	200,000	5 0 0	6 0	Nov., 1899	28 2 6	28 7 6
Jubilee, g., Transvaal	50,000	1 0 0	bonus.	Aug., 1902	5 5 0	5 10 0
Jumpers, Transvaal	100,000	1 0 0	5 0	Aug., 1899	3 17 6	4 2 6
Langlaagte Est., g., Transvaal	470,000	1 0 0	3 0	Sept., 1899	4 2 6	4 5 0
May Con., g., Transvaal	288,750	1 0 0	3 0	Feb., 1903	4 10 0	4 12 6
Meyer & Charlton, g., Transvaal	100,000	1 0 0	3 0	Feb., 1903	5 10 0	5 12 6
Namaqua, c., Cape Colony	94,331	2 0 0	2 0	June, 1902	3 7 6	3 10 0
Primrose (New), g., Transvaal	325,000	1 0 0	2 0	Feb., 1903	3 17 6	4 0 0
Rand Mines, g., S. Africa	1,795,956	5 0	4 0	Aug., 1902	11 0 0	11 2 6
Robinson, g., Transvaal	750,000	5 0 0	6 0	Feb., 1903	10 13 9	10 16 3
Robinson Deep, g., Transvaal	950,000	1 0 0	5 0	May, 1899	5 6 3	5 8 9
Rose Deep, Transvaal	425,000	1 0 0	2 0	Feb. 1903	9 2 6	9 7 6
Salisbury, g., Transvaal	100,000	1 0 0	2 0	Mar., 1899	2 12 6	2 15 0
Sheba, g., Transvaal	1,075,000	1 0 0	6	July, 1898	1 2 6	1 5 0
Village Main Reef, Transvaal	400,000	1 0 0	5 0	Oct., 1902	8 17 6	9 0 0
Wemmer, Transvaal	80,000	1 0 0	10 0	Jan., 1903	12 15 0	13 0 0

c.—Copper. d.—Diamonds. g.—Gold. l.—Lead. s.—Silver.

LONDON. (*By Cable*).*

Name of Company.	Apr. 21. £.	s.	d.	Apr. 28. £.	s.	d.	Name of Company	Apr. 21. £.	s.	d.	Apr. 28. £.	s.	d.
Anaconda	5	12	6	5	12	6	Johannesburg Invest	3	5	0	3	5	0
British South Africa	3	3	9	3	3	9	Modderfontein	10	1	3	10	1	10½
Camp Bird	1	15	9	1	17	4½	Rand Mines	11	2	6	11	2	6
Con. Gold-Fields	7	15	0	7	15	0	Rio Tinto com	50	10	0	50	10	0
De Beers Con. def	22	0	0	22	0	0	Simmer & Jack	1	13	9	1	13	3
East Rand	8	3	9	8	4	6	Tomboy	2	0	0	1	18	9
El Oro, Mex	1	13	9	1	13	1½							
Jagersfontein	28	12	6	28	12	6							

*Furnished by Wm. P. Bonbright & Co., 15 Wall St., New York.

PARIS. April 15.

Name of Company.	Country.	Product.	Capital Stock.	Par value.	Latest divs.	Prices. Opening.	Closing.
			Francs.	Fr.	Fr.	Fr.	Fr.
Boleo	Lower Cal	Copper	1,000,000	500	176.00	1,470.00	1,470.00
Champ d'Or	S. Africa	Gold	3,375,000	25	3.75	22.25	22.25
Fraser River	Brit. Col'mb.	Gold	250,000	25	.....	6.50	6.50
Huanchaca	Bolivia	Silver	40,000,000	125	5.00	108.00	107.00
Metaux, Cie. Fran. de	France	Metal dealers.	25,000,000	500	22.50	496.00	482.00
Nickel	N. Caled'nia	Nickel	15,000,000	250	22.50	460.00	474.00
Rebecca	Colo'do, U. S.	Gold	5,000,000	25	.....	0.75	0.75
Vielle Montagne	Belgium	Zinc	9,000,000	30	30.00	680.00	675.00

TORONTO, ONT.* Apr. 25.

Name of Company.	par val	Prices. High.	Low.	Sales.	Name of Company	Par val	Prices. High.	Low.	Sales
Black Tail	$1	.07½	.04	.....	Granby Smelter	$10	510	430	.....
Cariboo (Mc. K.)	1	.16	.12	2,000	Mountain Lion	1	11¾	.....	.....
Cariboo (Hyd.)	1	.75	.....	.....	North Star	1	15	11½	1,000
Center Star	1	.31	.28	4,000	Nova Scotia Steel, com	100	1 03	98½	.....
Crows Nest. C.	100	.....	.....	.....	Payne	1	.21	.18	.....
Dominion Coal, com	100	1.08	1.03½	305	Rambler Cariboo	1	.35	.25	1,400
Dominion S. & I.	100	.28¾	.28	.....	Republic	1	.07	.05	.....
Dominion S. & I., pref.	100	.69	.61	.....	St. Eugene	1	.45	.35	.....
Fairview	1	.06¼	.05¾	37,500	Virtue	1	.09	.06	.....
Giant	1	.03½	.02	.....	War Eagle Con	1	.16	.12	.....

*Standard Stock and Mining Exchange. Total sales 44,805 shares

DIVIDENDS.

GOLD, SILVER, COPPER, LEAD, QUICKSILVER AND ZINC COMPANIES.—UNITED STATES.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Acacia, g	Colo.	$1,500,000	1,433,800	$1	$14,390	$57,5 0	Apr. 1903	.01
Adams, s. l. c	Colo...	1,500,000	150,000	10	.....	738,500	Oct. 1902	.05
Aetna Con., q	Cal....	500,000	100,000	5	.....	225,000	Apr. 1900	.15
Alaska-Mexican, g	Alaska.	1,000,000	180,000	5	36,000	501,381	Apr. 1903	.10
Alaska-Treadwell, g	Alaska.	5,000,000	200,000	25	230,000	5,050,000	Apr. 19 3	.75
Amalgamated, c	Mont..	155,000,000	1,538,879	100	1,538,880	21,196,540	May. 1903	.50
Am. Sm. & Ref., pf	U. S...	50,000,000	500,000	100	1,750,000	10,641,553	Apr. 1903	1.75
Anaconda, c	Mont.	30,000,000	1,200,000	25	600,000	22,650,000	Apr. 1903	.50
Annie Laurie, g	Utah..	5,000,000	.....	50,000	100	110,000	Mar. 1903	1.00
Arizona, c	Ariz..	3,775,000	.....	.....	501,554	3,947,032	Feb. 1903	.....
Atlantic, c	Mich.	1,000,000	40,000	25	.....	940,000	Feb. 1901	2.00
Bald Butte, g. s	Mont.	250,000	240,000	1	15,000	1 312,148	Jan. 1903	.06
Boston & Colo. Sm	Colo..	750,000	15,000	50	.....	402,450	Oct. 1902	.75
Boston Gold-Copper Sm	Colo..	1,000,000	1,000,000	1	.....	150,000	Nov 1901	.02½
Boston & Mont. Con., c. s. g	Mont..	3,750,000	150,000	25	600,000	27,725,000	Apr. 1903	2.00
Breece, l. s	Colo...	5,000,000	200,000	25	.....	190,000	Sept. 1902	.05
Bunker Hill & Sullivan	Idaho	3,000,000	300,000	10	45,000	1,487,000	May 1903	.03
Butte & Boston, c	Mont.	2,000,000	200,000	10	.....	1,600,000	Nov. 1901	3.00
Butterfly-Terrible, g	Colo..	1,500,000	1,250,000	1	.....	31,250	Oct .. 1901	.00½
C. K.& N, g	Colo ..	1,500,000	1,431,000	1	14,310	28,638	Mar.. 1903	.01
Calumet & Hecla, c	Mich .	2,500,000	100,000	25	500,000	80,350,000	Mar.. 1903	5.00
Camp Bird, g	Colo..	5,500,000	820,000	5	140,700	332,100	Mar.. 1903	.15
Carisa, g. s. c	Utah.	500,000	500,000	1	.....	30,000	Nov.. 1901	.03
Centennial Eureka, g. s. l. c	Utah .	5,000,000	100,000	25	.....	2,667,700	Jan.. 1903	.50
Center Creek, l. z	Mo	1,000,000	100,000	10	.....	80,000	Mar .. 1902	.10
Central Eureka, g	Cal	4,000,000	398,425	10	.....	21,718	Sept. 1902	.02
Central, l	Mo	1,000,000	10,000	100	20,000	345,000	Apr .. 1903	.50
Cherry Hill, g	Cal	1,000,000	1,000,000	1	.....	47,500	June. 1902	.00½
Chippewa Con., g. s. l	Colo..	150,000	150,000	1	.....	2,50	Dec.. 1902	.00½
Con. Mercur, g	Utah..	5,000,000	1,000,000	5	150,000	1,000,000	May. 1903	.03
Continental, g	Mo	550,000	22,000	25	.....	17,600	Oct .. 1902	.40
Cripple Creek, g pf	Colo..	125,000	125,000	1	.....	45,000	Jan.. 1902	.04
Croesus, g	Cal	1,000,000	200,000	5	.....	227,300	Aug .. 1901	.05
Dalton & Lark, g. s. l	Utah..	2,500,000	2,500,000	1	.....	350,000	July .. 1901	.10½
Daly West,	Utah..	3,000,000	180,000	20	432,000	2,691,000	Apr.. 1903	.60
De Lamar, g. s	Idaho	400,000	67,181	5	.....	2,708,084	Oct.. 1902	.48
Doctor-Jack Pot Con., g	Colo..	3,000,000	2,900,000	1	.....	232,000	Aug .. 1901	.01
Doe Run, l	Mo	1,500,000	15,000	100	45,000	582,272	Apr.. 1903	1.50
Ducktown c. i. sul. (Ord)	Tenn ..	374,000	74,800	5	.....	165,250	Dec.. 1901	.25
Ducktown (Fndr)	Tenn ..	1,000	200	5	.....	75,250	May .. 1901	75.00
Elkton Con., g	Colo..	3,000,000	2,500,000	1	.....	1,404,461	Mar .. 1902	.04
Empire State-Idaho, l. s	Idaho	6,000,000	505,542	10	101,108	1,692,770	Apr .. 1903	.05
Free Coinage, g	Colo..	1,000,000	10,000	100	.....	160,000	Dec.. 1902	.20
Gemini	Utah..	500,000	5,000	100	50,000	900,000	Mar.. 1903	10.00
Gold Coin of Victor, g	Colo..	1,000,000	1,000,000	1	10,000	1,230,000	Jan .. 1903	.01
Gold King, g	Colo..	1,000,000	936,850	1	18,737	43 ,951	Apr.. 1903	.02
Golden Argus, g	Cal	800,000	8,000	100	.....	2,000	Dec.. 1902	.25
Golden Cycle, g	Colo..	2,000,000	1,500,000	1	112,500	168,750	Mar. 1903	.05
Golden Eagle, g	Colo..	500,000	483,015	1	.....	98,916	Sept. 1901	.01
Good Hope, g. s	Colo..	50,000	50,000	1	100	12,500	Jan.. 1903	.25
Grand Central, g	Utah..	250,000	250,000	1	50,000	681,250	Apr.. 1903	.10
Gwin, g	Cal	1,000,000	100,000	10	.....	426,500	Dec.. 1902	.15
Hecla Con., s. l	Mont.	1,500,000	30,000	50	.....	2,930,550	Apr.. 1903	.25
Homestake, g	S. D...	21,840,000	218,400	100	218,400	11,930,550	Apr. 1903	.25
Horn Silver, g. s. c. z. l	Utah..	10,000,000	400,000	25	.....	5,342,000	Dec.. 1901	.10
Independence Con., g	Colo..	2,500,000	2,500,000	1	.....	281,375	Apr.. 1901	.04
Ingham Con., g	Colo..	750,000	1,359,600	½	.....	33,981	Aug.. 1901	.00½
International Nickel, pf	U. S.	12,000,000	9,000,000	100	360,000	360,000	May 1903	4.00
Iowa, g. s. l	Colo..	1,696,667	1,696,667	1	33,334	303,503	Apr.. 1903	.01
Iron Silver	Colo..	10,000,000	500,000	20	100,000	2,756,000	May .. 1903	.10
Isabella, g	Colo..	2,250,000	2,250,000	1	.....	742,500	Mar .. 1901	.01
Jamison g	Cal	3,900,000	390,000	10	11,700	74,100	Jan .. 1903	.03
Kennedy, g	Cal	10,000,000	100,000	100	.....	1,801,000	June. 1901	.05
La Fortuna, g	Ariz..	250,000	250,000	1	.....	1,062,500	Oct.. 1902	.05
Last Dollar, g	Colo..	1,500,000	1,500,000	1	30,000	210,000	Mar.. 1902	.02
Liberty Bell, g	Colo..	700,000	130,349	5	39,104	52,139	Apr.. 1903	.15
Lightner, g	Cal	125,000	102,255	1	5,113	38,343	Mar. 1903	.05
Mammoth, g. s. c	Utah..	10,000,000	400,000	25	.....	1,890,000	July .. 1901	.05
Mary McKinney, g	Colo..	1,000,000	1,000,000	1	60,000	530,000	Apr .. 1903	.03
May Day, g	Utah..	100,000	400,000	¼	.....	30,000	Mar .. 1902	.01
Midget, g	Colo..	1,000,000	1,000,000	1	.....	195,000	Apr.. 1902	.15
Mines Co. of America, Finc'l	U. S....	2,000,000	2,000,000	1	100,000	125,000	Apr .. 1903	.01¼
Modoc, g. s	Colo..	500,000	500,000	1	5,000	255,000	Jan .. 1903	.01
Mont. Ore Purchasing	Mont.	2,500,000	81,200	25	162,000	2,840,000	Jan .. 1903	2.00
Mountain, c	Cal	6,250,000	250,000	25	.....	3,633,750	Nov.. 1902	.90
Mine La Motte, l	Mo	3,000,000	30,000	10	120,000	120,000	Apr.. 1903	.20
Napa Con., q	Cal	700,000	100,000	7	.....	1,180,000	Oct .. 1902	.10
National Lead, com	U. S....	15,000,000	149,054	100	.....	1,341,486	Mar. 1900	1.00
National Lead, pfd	U. S....	15,000,000	149,040	100	260,820	13,187,708	Mar.. 1903	1.75
New Idria, q	Cal	5,000,000	100,000	5	60,000	490,000	Apr.. 1903	.30
New Jersey, z	U. S....	10,000,000	100,000	100	300,000	5,100,000	Feb. 1903	3.00
New Leadville Home, g	Colo..	2,000,000	2,000,000	1	.....	265,500	Feb. 1902	.00½
Nugget, g	Colo..	1,000,000	991,000	1	.....	84,739	July .. 1901	.01
Ontario, s. l	Utah..	15,000,000	150,000	100	.....	14,997,000	Dec.. 1902	.30
Osceola, c	Mich .	2,500,000	96,150	25	.....	4,247,300	Dec.. 1901	3.00
Parrot, c	Mont..	2,300,000	229,850	10	.....	5,772,925	Jan.. 1902	.50
Pioneer, g	Alaska.	5,000,000	50,000	100	.....	300,000	Dec.. 1902	6.00
Pointer, g	Colo..	1,250,000	1,250,000	1	.....	25,000	June. 1901	.01
Portland, g	Colo..	3,000,000	3,000,000	1	80,000	4,387,080	Jan.. 1903	.03
Pride of the West	Ariz..	1,500,000	150,000	10	.....	15,000	Oct. 1900	.10
Quicksilver, pfd	Cal	4,300,000	43,000	100	21,500	1,911,411	May. 1903	.50
Quincy, c	Mich .	2,500,000	100,000	25	250,000	13,820,000	Feb. 1903	2 50
Rob Roy, z	Mo	15,000	13,725	1	549	915	Jan.. 1903	.04
Rocco-Homestake-Nevada, l. s.	Nev....	3,000,000	240,000	1	.....	90,000	Nov.. 1902	.01
Sacramento, g	Utah..	5,000,000	1,000,000	5	20,000	153,000	Apr 1903	.00½
St. Joseph, l	Mo	6,000,000	375,000	10	54,250	3,685,750	Mar.. 1903	.15
Silver Hill, g. s	Nev....	180,000	180,000	1	9,000	19,800	Mar.. 1903	.05
Silver King, g. s. l	Utah..	3,000,000	150,000	20	400,000	6,450,000	Apr .. 1903	.66⅔
Smuggler, s. l. z	Colo..	1,000,000	1,000,000	1	.....	2,175,000	Feb.. 1901	.01
Spearfish, g. pf	So. Dak	1,000,000	882,000	1	35,280	52,920	Apr.. 1903	.01
Specie Payment, g	Colo..	1,000,000	100,000	1	.....	40,190	Oct. 1902	.0
Standard Con., g. s	Cal	2,000,000	178,394	10	17,839	4,124,453	Feb. 1903	.10
Standard, c	Ariz..	500,000	400,000	1	10,000	10,000	Mar. 1903	.02½
Standard, s. l	Idaho.	500,000	500,000	1	100,000	2,820,000	Apr.. 1903	.05
Stratton's Independence, g	Colo..	5,500,000	1,000,007	5	.....	3,770,880	Apr.. 1902	.12
Swansea, s. l	Utah..	500,000	100,000	5	.....	330,500	June 1901	.05
Syndicate, g	Cal	100,000	100,000	1	.....	82,040	Aug. 1902	.02
Tamarack, c	Mich .	1,500,000	60,000	25	.....	8,490,000	Dec.. 1901	10 00
Tomboy, g. s	Colo..	1,500,000	300,000	5	.....	1,244,000	July .. 1902	.24
Town Topics, g. c	Colo..	1,000,000	1,000,000	1	5,000	40,000	Mar.. 1903	.03½
Trimountain, c	Mich .	2,500,000	100,000	25	150,000	150,000	Mar.. 1903	1 50
Trinity County, g	Cal	1,000,000	100,000	10	25,000	25,000	May. 1903	.05
Union, g	Colo..	1,250,000	1,250,000	1	.....	445,244	Jan.. 1902	.02
Union, z. l	Kas....	500,000	300,000	1	.....	16,000	July .. 1901	.01
United, c, pf	Mont..	5,000,000	50,000	100	150,000	300,000	May 1903	3.00
United, g	Colo..	5,000,000	3,994,769	1	40,094	319,931	Apr.. 1903	.01
United, z. l., com	Mo	5,000,000	78,990	5	7,784	22,961	Apr.. 1903	.05
United, z. l., pfd	Mo	1,000,000	18,998	25	17,040	99,995	Apr.. 1903	.50
United Verde, c	Ariz..	3,000,000	300,000	10	225,000	13,200,322	Apr.. 1903	.75
U. S. Red. & Ref., com	Colo..	6,000,000	59,198	100	118,376	295,602	Apr. 1903	1.00
U. S. Red. & Ref., pf	Colo.	4,000,000	39,458	100	118,374	354,447	Apr.. 1903	1 50
Utah, g	Utah..	1,000,000	100,000	10	8,000	215,000	Apr.. 1903	.02
Utah Con., c	Utah..	1,500,000	300,000	5	504,000	1,239,000	Jan.. 1903	1.68
Vindicator Con., g	Colo..	1,500,000	1,100,000	1	110,000	1,027,000	Apr.. 1903	.05
Waldorf, g	Colo..	3,000,000	3,000,000	1	.....	25,000	Dec.. 1902	.0½
Wasp No. 2, g	S. Dak	500,000	147,000	1	.....	218,450	June. 1902	.00½
White Rock, g	Nev....	500,000	200,000	2½	.....	2,000	Aug.. 1902	.01
Wolverine, c	Mich .	1,500,000	60,000	25	150,000	1,050,000	Apr. 1903	2 50
Yankee Con., g. s. l	Utah..	500,000	500,000	1	.....	75,000	Apr.. 1902	.05
Yellow Aster, g	Cal	1,000,000	100,000	10	20,000	493,780	Mar.. 1903	.10

NOTE.—These dividends are published gratuitously. Readers are invited to send any corrections or additions which they think necessary to complete our list.

COAL, IRON AND INDUSTRIALS.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Ala. Con., Coal & Iron, pfd	Ala....	$2,500,000	$24,638	$100	$43,117	$560,529	Mar.. 1903	$1.75
Ala. & Ga. Iron, pf	.....	650,000	6,500	100	6,500	6,500	Jan.. 1903	1.00
Allis-Chalmers, pfd	U. S...	25,000,000	200,000	100	568,750	2,859,375	May. 1903	1.75
Alma Oil	Cal	400,000	400,000	1	12,000	12,000	Mar. 1903	.03
Altoona Coal & Coke Co	Pa....	2,500 000	250,000	10	.....	75,000	Jan.. 1901	.30
Amer. Agr. Chem., pfd	U. S...	20,000,000	181,350	100	544,050	4,126,710	Apr.. 1903	3.00
American Cement	Pa....	2,100,000	200,000	10	160,000	540,000	Apr.. 1903	.40
American Coal	Md....	1,500,000	60,000	25	75,000	1,357,500	Mar.. 1903	1.25
American Iron & Steel, com	Pa....	17,000,000	34,000	50	.....	256,100	May . 1902	.15
American Iron & Steel, pfd	Pa....	3,000,000	60,000	50	75,000	525,000	Apr.. 1903	.62½
American Steel Foundries, pfd	U. S...	15,500,000	155,000	100	232,500	465,000	Mar.. 1903	1.50
Aztec Oil	Cal	250,000	235,000	1	4,700	21,150	Mar.. 1903	.03
Cambria Steel	Pa....	50,000,000	900,000	50	675,000	5,775,000	Feb.. 1903	.75
Central Coal & Coke, com	Mo	5,125,000	51,250	100	153,750	397,500	Apr.. 1903	1.50
Central Coal & Coke, pfd	Mo	1,875,000	18,750	100	46,874	749,998	Apr.. 1903	4.25
Central Oil	W.Va...	1,500,000	60,000	25	15,000	137,500	May. 1903	.25
Central Oil	Cal....	1,000,000	800,000	1	.....	169,247	Jan. 1902	.03
Colorado Fuel & Iron, com	Colo....	38,000,000	339,310	100	.....	1,642,500	Apr.. 1902	1.75
Colorado Fuel & Iron, pfd	Colo....	2,000,000	20,000	100	80,000	1,560,000	Feb. 1903	4.00
Columbus & Hocking C. & I	Ohio	7,000,000	69,220	100	34,610	69,220	Mar.. 1903	.50
Consolidation Coal	Md....	10,250,000	102,500	100	205,000	5,728,000	Jan.. 1903	2.00
Consolidated Coal	Ill....	5,000,000	50,000	100	.....	160 000	Jan.. 1902	1.00
Crucible Steel, pfd	U. S...	25,000,000	250,000	100	437,500	4,375,000	Mar.. 1903	1.75
Cummings Cement	N. Y..	300,000	3,000	100	.....	189,000	July . 1902	9.00
Dixon, Joseph, Crucible	N. J..	1,000,000	7,345	100	14,690	.....	Apr.. 1903	1.00
Empire Steel & Iron, pfd	U. S...	5,000,000	23,700	100	35,550	355,442	Jan .. 1903	1.50
Four Oil	Cal....	300,000	208,700	1	6,261	33,392	Apr.. 1903	.01
General Chem., com	U. S...	12,500,000	100,000	100	291,240	2,266,418	Apr.. 1903	1.50
General Chem., pfd	U. S...	12,500,000	100,000	100	300,000	.....	Jan.. 1903	3.00
George's Creek Coal & Iron	Md....	2,500,000	22,000	100	33,000	.....	Jan.. 1903	1.50
Giant Oil	Cal	500,000	500,000	1	5,000	5,000	Jan.. 1903	.01
Hanford Oil	Cal....	20,000	2,000	10	.....	13,000	Sept. 1902	1.50
Heywood Oil	Tex....	800,000	800,000	1	16,000	144,000	Jan.. 1903	.02
Higgins Oil	Tex....	2,500,000	17,600	100	.....	96,800	Apr.. 1902	1.50
Home Oil	Cal....	100,000	100,000	1	30,000	480,000	Apr.. 1903	.07½
Homestake Oil	Cal....	10 ,000	10,000	10	.....	33,000	Aug.. 1902	.15
Houston Oil, pfd	Tex....	7,500,000	75,000	100	224,125	806,500	Feb.. 1903	3.00
Imperial Oil	Cal....	1,000,000	100,000	100	100,000	360,000	May . 1903	.20
Int'l Acheson Graphite, pfd	N. Y....	500,000	5,000	100	17,500	87,500	Feb. 1903	3 50
Jeff. & Clearf., Coal & Iron, com	Pa....	1,500,000	15,000	100	.....	105,000	Aug.. 1902	5.00
Jeff. & Clearf., Coal & Iron, pfd	Pa....	1,500,000	15,000	100	37,500	563,000	Feb. 1903	2.50
Lehigh Coal & Nav	Pa....	14,346,650	286,933	50	.....	20,095,120	Nov . 1902	1.00
Maryland Coal, pfd	Md....	2,000,000	18,850	100	.....	885,950	Dec.. 1902	5.00
Monongahela R. Coal, pfd	Pa....	10,000,000	98,300	50	347,165	2,777,180	Jan.. 1903	3.50
Monte Cristo Oil	Cal....	500,000	500,000	1	15,000	15,000	Apr.. 1903	.01
National Carbon, pf	U. S...	4,500,000	45,000	100	78,750	1,338,750	Feb. 1903	1.75
Ohio & Indiana Natural Gas	U. S...	10,000,000	90,000	100	90,000	1,170,000	Mar.. 1903	1.00
Pacific Coast Borax	Cal....	2,000,000	19,000	100	76,000	1,283,500	Apr.. 1903	1.00
Peerless Oil	Cal....	1,000,000	92,000	10	40,480	87,760	Apr.. 1903	.12
Pennsylvania Salt Mfg	Pa....	5,000,000	100,000	50	150,000	13,300,000	Apr.. 1903	3.00
Penna. Steel of N. J	Pa....	25,000,000	168,214	100	588,750	2,917,000	May . 1903	3.50
Philadelphia Gas, com	Pa....	16,102,131	308,542	50	462,812	2,854,019	May . 1903	.75
Philadelphia Gas, pfd	Pa....	3,898,350	212,573	50	99,959	946,108	Mar.. 1903	1.25
Pittsburg Coal, pfd	Pa....	32,000,000	297,042	100	1,039,542	7,276,794	Apr.. 1903	1.75
Pittsburg Oil	Cal....	300,000	220,000	1	12,000	12,000	May . 1903	.02½
Rep. Iron & Steel, pfd	U. S...	25,000,000	203,569	100	712,492	5,336,786	Apr.. 1903	1.75
Retsof Salt	N. Y....	5,000,000	36,000	100	72,000	648,000	Apr.. 1903	1.00
San Joaquin Oil	Cal....	100,000	100,000	1	5,000	65,000	Feb.. 1903	.05
Shelby Iron	Ala....	1,000,000	10,000	100	10,000	300,000	May . 1903	10.00
Sloss-Sheffield Steel & Iron, pfd	Ala....	20,000,000	68,000	100	228,000	1,482,000	Apr.. 1903	1.75
St. Bernard Coal & Coke	K. Tenn	1,000,000	10,000	100	.....	770,000	Dec.. 1902	6.00
Standard Oil (of N. J.)	U. S...	100,000,000	970,000	100	19,400,000	183425,000	Mar.. 1902	20.00
Susquehanna I. & S., pfd	Pa....	1,500,000	300,000	5	45,000	717,500	Jan .. 1903	.15
Temple Iron	Pa....	240,000	2,400	100	7,200	14,400	Jan .. 1903	3.00
Tenn. C. I. & R. R., com	Tenn ..	23,000,000	225,536	100	.....	1,102,144	Nov.. 1900	2.00
Tenn. C. I. & R. R., pfd	Tenn ..	248,000	2,480	100	9,920	297,135	May . 1903	2.00
Tex. & Pacific Coal	Tex....	2,000,000	20,000	100	80,000	2,100,000	Apr.. 1903	1.50
Thirty-three Oil	Cal....	500,000	100,000	5	50,000	170,000	May . 1903	.10
Thomas Iron	Pa....	2,500,000	25,000	100	.....	200,000	Aug.. 1902	4.00
Tidewater Steel, pfd	Pa....	600,000	60,000	1	18,000	18,000	Jan.. 1903	.30
Union Oil	Cal....	10,000,000	52,672	100	36,870	334,465	Jan.. 1903	.70
U. S. Steel Corp., com	U. S...	550,000,000	5,083,035	100	10,166,050	45,726,552	June. 1903	1.00
U. S. Steel Corp., pfd	U. S...	550,000,000	5,102,811	100	17,859,838	80,332,910	May . 1903	1.75
Va.-Carolina Chem., com	U. S...	38,000,000	279,844	100	349,805	3,329,064	Mar.. 1903	1.25
Va.-Carolina Chem., pfd	U. S...	12,000,000	120,000	100	480,000	6,540,000	Apr.. 1903	2.00
Victoria Coal & Coke, com	W. Va..	150,000	1,500	100	.....	15,000	Jan.. 1901	10.00
Victoria Coal & Coke, pfd	W. Va..	100,000	1,000	100	.....	15,000	July . 1902	3.00
Westmoreland Coal	Pa....	5,000,000	250,000	50	375,000	7,875,000	Apr.. 1903	1.50
West Shore Oil	Cal....	100,000	100,000	1	20,000	65,000	Apr.. 1903	.05

CANADA, CENTRAL AND SOUTH AMERICA, MEXICO.

Name and Location of Company.		Author-ized Capital Stock.	Shares. Issued.	Par Val	Dividends. Paid 1903.	Total to Date.	Latest. Date.	Amt.
Amistad y Concordia	Mex.	$480,000	9,000	$50	$18,270	$97,300	Jan.. 1903	$2.03
Barreno	Mex.	.....	2,400	.....	6,316	49,886	Apr.. 1903	.77
Bartolome de Medina Mill	Mex.	50,000	2,000	25	5,775	69,258	Apr.. 1903	.58
Cariboo McKinney, g	B. C.	1,250,000	1,250,000	1	.....	496,837	Mar 1902	.02½
Center Star, g	B. C.	3,500 000	3,500,000	1	.....	210,000	May . 1901	.01
Cinco Senores	Mex.	.....	2,000	.....	30,630	688,735	Apr.. 1903	3.85
Coplapo, c	Chili..	1,125,000	112,500	10	39,900	2,895,900	Feb. 1903	.36
Dominion Iron & Steel, pf	N.S...	5,000,000	50,000	100	175,000	700,000	Apr.. 1903	3.50
Dominion Coal, pf	N. S...	3,000,000	30,000	100	120,000	2,286,000	Apr.. 1903	2 00
Dos Estrellas	Mex..	150,000	3,000	50	34,650	259,650	Mar.. 1903	11.55
El Oro, g. s	Mex..	5,000,000	1,000,000	5	.....	1,886,100	Dec.. 1902	.38
Esperanza, s. g	Mex..	150,000	3,000	50	46,020	1,116,099	May . 1903	3.95
Frontino & Bolivia c	Colom.	643,310	128,662	5	.....	1,211,703	July . 1903	.72
Goodenough, s. l	B. C.	800,000	659,400	1	.....	13,188	Jan. 1902	.01
Greene Con., c	Mex..	7,200,000	720,000	10	288,000	568,000	Feb. 1903	.20
Guadalupana	Mex..	15,000	3,000	5	4,620	67,620	Feb. 1903	.77
Guadalupe Mill	Mex..	1,000,000	10,000	100	30,800	1,515,750	Apr.. 1903	.77
Le Roi, g	B. C	5,000,000	200,000	25	.....	1,305,000	Nov . 1899	1.20
Le Roi No. 2, g	B. C.	3,000,000	120,000	25	.....	288,000	May . 1902	1.20
Mesquital	Mex..	125,000	250,000	½	15,000	51,458	Feb.. 1903	.06
Metallurgical Co., of Torreou	Mex..	1,500,000	30,000	50	187,500	187,500	Apr.. 1903	7.50
Natividad, s. g	Mex..	36,000	2,400	15	20,400	164,400	Apr.. 1903	2.28
N. Y. & Hond. Rosario, s. g	C. A..	1,500,000	150,000	10	63,000	1,910,000	Apr.. 1903	3.08
North Star, s. l	B. C.	1,500,000	1,300,000	1	.....	312,000	Sept. 1902	.01½
Nova Scotia St. & Coal, com	N. S.	5,000,000	50,000	100	50,000	323,000	Apr.. 1903	1.00
Nova Scotia St. & Coal, pfd	N. S.	2,000,000	10,300	100	20,600	144,200	Apr.. 1903	2.00
Payne Con., s. l	B. C.	3,000,000	2,000,000	1	.....	1,438,000	Jan.. 1901	.03
Penoles (Map.), s. l	Mex..	125,000	2,500	50	47,825	2,026,114	Jan.. 1903	19.13
Providencia (S. J.)	Mex..	90,000	6,000	15	13,800	174,300	Mar.. 1903	.77
Rambler-Cariboo, s. l	B. C.	1,250,000	1,250,000	1	.....	229,000	Nov . 1902	.01
Real del Monte	Mex..	.....	2,554	.....	9,833	2,883,083	Feb.. 1903	3.85
St. John del Rey, g	Brazil	3,000,000	546,285	5	.....	14,076,995	Dec.. 1902	.12
Soledad, s. l	Mex..	19,200	960	20	9,159	231,400	Apr.. 1903	3.85
Sorpresa	Mex..	19,200	960	20	1,836	187,489	Mar.. 1903	1.91
Sta. Maria de Guadalupe	Mex..	2,500	2,500	1	.....	377,918	Sept. 1902	4.08
Sta. Maria de la Paz	Mex..	.....	2,400	.....	.....	1,848,273	Dec.. 1902	7.65
San Francisco Mill	Mex..	50,000	6,000	25	.....	284,700	Nov . 1902	.40
Sta. Gertrudis	Mex..	1,920,000	38,400	50	55,224	2,702,568	Apr.. 1903	.....
San Rafael	Mex..	60,000	2,400	25	44,444	1,817,512	Apr.. 1903	.....
St. Eugene Con., s. l	B. C.	3,500,000	3,500,000	1	.....	210,000	Apr.. 1901	.03
Union Mill	Mex..

CHEMICALS, MINERALS, RARE EARTHS, ETC.—CURRENT WHOLESALE PRICES.

(See also Market Reviews.)

	Cust.Meas.	Price.
ABRASIVES—		
Carborundum, f.o.b. Niagara Falls, Powd., F.FF.FFF.	lb.	$0.08
Grains	"	.10
Corundum, N. C.	"	.07@.10
Chester, Mass.	"	.04½@.05
Barry's Bay, Ont.	"	.07½@.09½
Mont. car-lots, f.o.b., Chicago	"	.07@.07½
Crushed Steel, f.o.b. Pittsburg	"	.05½
Emery, Turkish flour in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Naxos flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Chester flour, in kegs	"	.03½
Grains, in kegs	"	.05@.05½
Peekskill, f.o.b. Easton, Pa., flour, in kegs	"	.01½
Grains, in kegs	"	.02½
Crude, ex-ship N. Y.; Abbott (Turkey)	lg.ton	26.50@30.00
Kuluk (Turkey)	"	22.00@24.00
Naxos (Greek) h. gr.	"	26.00
Garnet, as per quality	sh.ton	25.00@35.00
Pumice Stone, Am. Powd	lb.	.01⅝@.02
Italian, powdered	"	.01½
Lump, per quality	"	.04@.40
Rottenstone, ground	"	.02½@.04½
Lump, per quality	"	.06@.20
Rouge, per quality	"	.10@.30
Steel Emery, f.o.b. Pittsburg	"	.07
ACIDS—		
Boracic, crystals	"	.10¾@.11
Powdered	"	.11¼@.11½
Carbonic, liquid gas	"	.12½
Chromic, crude	"	.20
Hydrofluoric, 30%	"	.03
48%	"	.05
60%	"	.11
Sulphurous, liquid anhy. f.o.b. Bound Brook, N.J.	"	.06
ALCOHOL—Grain	gal.	2.40@2.42½
Refined wood 95@97%	"	.60@.65
Purified	"	1.20@1.50
ALUM—Lump	100 lbs.	1.65
Ground	"	1.70
Porous	"	.80
Chrome, com'l	"	2.75@3.00
ALUMINUM—		
Nitrate	lb.	1.50
Oxide, com'l, common	"	.06½
Best	"	.20
Pure	"	.80
Hydrated	100 lbs.	2.60
Sulphate, com'l	"	1.25@1.50
AMMONIA—		
Aqua, 16°	lb.	.03
18°	"	.03¼
20°	"	.03¾
26°	"	.05½
AMMONIUM—		
Carbonate, lump	"	.07½
Powdered	"	.08¼
Muriate	"	.05¾
Lump	"	.09
Nitrate, white pure (99%)	"	.12
Phosphate, com'l	"	.00
Pure	"	.12
ANTIMONY—Glass	"	.30@.40
Needle, lump	"	.05½@.06
Powdered, ordinary	"	.05¾@.07¼
Oxide, com'l white, 95%	"	.09¼
Com'l white, 95%	"	.12
Com'l gray	"	.07
Sulphuret, com'l	"	.16
ARSENIC—White powd.	"	.03@.03½
Red	"	.06½@.06¾
ASPHALTUM—		
Ventura, Cal.	sh.ton	32.00
Cuban	lb.	.01½@.03½
Egyptian, crude	"	.05½@.06
Trinidad, refined	sh. ton	35.00
San Valentino (Italian)	lg. ton	16.00
Seyssel (French), mastic	sh. ton	21.00
Gilsonite, Utah, ordinary	lb.	.03
Select	"	.03¾
BARIUM—		
Carb. Lump, 80@90%	sh.ton	25.00@27.50
92@98%	"	26.00@29.00
Powdered, 80@90%	lb.	.01¾@.02
Chloride, com'l	100lbs.	1.67½@1.76
Chem. pure cryst	lb.	.05
Nitrate, powdered	"	.05⅛
BARIUM	Cust.Meas.	Price.
Sulphate (Blanc Fixe)	lb.	$0.01⅞
BARYTES—		
Am. Crude, No. 1	sh.ton	9.00
Crude, No. 2	"	8.00
Crude, No. 3	"	7.75
Floated	"	18.75
Foreign, gray	"	14.00
Snow white	"	17.00
Floated	"	18.75
BAUXITE—Ga. or Ala. Mines:		
First Grade	lg.ton	5.50
Second grade	"	4.75
BISMUTH—Subnitrate	lb.	2.00
Subcarbonate	"	2.25
BITUMEN—"B"	"	.03½
"A"	"	.05
BONE ASH	"	.02¼@.02½
BORAX	"	.07¼@.07½
BROMINE—Bulk.	"	.35
CADMIUM—Metallic	"	1.40
Sulphate	100 lbs.	2.00@2.50
CALCIUM—Acetate, gray	"	1.40
" brown	"	.95
Carbide, ton lots f.o.b. Niagara Falls, N. Y., for Jersey City, N. J.	sh.ton	70.00
Carbonate, ppt.	lb.	.05
Chloride	100 lbs.	.70@.90
CEMENT—		
Portland, Am., 400 lbs.	bbl.	2.00@2.15
Foreign	"	1.95@2.50
"Rosendale," 300 lbs	"	.80
Slag cement, imported	"	1.65
CERESINE—		
Orange and Yellow	lb.	.13
White	"	.14
CHALK—Lump, bulk	Sh.ton	3.00
Ppt. per quality	lb.	.04¼@.05¼
CHLORINE—Liquid	"	.30
Water	"	.10
CHROME ORE—		
(50% ch.) ex-ship N. Y.	lg.ton	24.75
Bricks f.o.b. Pittsburg	M	175.00
CLAY, CHINA—Am. com., ex-dock, N. Y.	lg.ton	8.25
Am. best, ex-dock, N. Y.	"	9.25
English, common	"	10.50
Best grade	"	17.00
Fire Clay, ordinary	sh.ton	4.25
Best	"	6.00
Slip Clay	"	5.00
COAL TAR PITCH	gal.	.08
COBALT—Carbonate	lb.	1.75
Nitrate	"	1.50
Oxide—Black	"	2.26@2.30
Gray	"	2.28@2.40
Smalt, blue ordinary	"	.06
Best	"	.20
COPPERAS—in bulk	100 lbs.	.42½
In bbls	"	.47½
COPPER—Carbonate	lb.	.18@.19
Chloride	"	.25
Nitrate, crystals	"	.35
Oxide, com'l	"	.19
CRYOLITE	"	.06½
EXPLOSIVES—		
Blasting powder, A	25 lb. keg	.65
Blasting powder, B	"	1.40
"Rackarock," A	lb.	.25
"Rackarock," B	"	.18
Judson R.R. powder	"	.10
Dynamite (20% nitro-glycerine)	"	.13
(30% nitro-glycerine)	"	.14
(40% nitro-glycerine)	"	.15
(50% nitro-glycerine)	"	.16½
(60% nitro-glycerine)	"	.18
(75% nitro-glycerine)	"	.21
Glycerine for ultro, (32-2-10° Be.)	"	.13⅛@.14
FELDSPAR—Ground	sh.ton	8.00@9.00
FLINT PEBBLES—Dan. Best.	lg.ton	14.75
French, Best	"	11.75
FLUORSPAR—		
Am. lump, 1st grade	sh.ton	14.40
2d grade	"	13.90
Gravel and crushed, 1st gr	"	13.40
2d grade	"	12.40
Ground, 1st grade	"	17.90
Ground, 2d grade	"	16.50
Foreign, lump	"	8.00@12.00
Ground	"	11.50@14.00
FULLER'S EARTH	100 lbs.	.80
GRAPHITE—Am. f.o.b. Providence, R. I., lump	sh.ton	$8.00
Pulverized	"	30.00
German, com. pulv.	lb.	.01¼@.01½
Best pulverized	"	.01½@.02
Ceylon, common pulv.	"	.02¾@.03½
Best pulverized	"	.04@.08
Italian, pulv	"	.01¼
GYPSUM—Ground	sh.ton	8.00@8.50
Fertilizer	"	7.00
Rock	lg.ton	4.00
English and French	"	14.00@16.00
INFUSORIAL EARTH—Gr'd.		
American best	"	20.00
French	"	37.50
German	"	40.00
IODINE—Crude	100 lbs.	2.45
IRON—Muriate	lb.	.05
Nitrate, com'l	"	.01¼
True	"	.04
Oxide, pure copperas color.	"	.05@.10
Purple-brown	"	.02
Venetian red	"	.01@.01½
Scale	"	.01@.03
KAOLIN—(See China Clay.)		
KRYOLITH—(See Cryolite.)		
LEAD—Acetate, white	"	.08¼@.08½
Brown	"	.06¼@.06½
Nitrate, com'l	"	.06½
" gran.	"	.08¼
LIME—Com., abt. 250 lbs.	bbl.	.75
Finishing	"	.95
MAGNESITE—Greece.		
Crude (95%)	lg. ton	5.50@6.00
Calcined	sh.ton	17.50@18.00
Bricks	M	170.00
Am. Bricks, f.o.b. Pittsburg	"	175.00
MAGNESIUM—		
Carbonate, light, fine pd.	lb.	.05
Blocks	"	.07@.09
Chloride, com'l	"	.01¾
Fused	"	.20
Nitrate	"	.60
Sulphate	100 lbs.	.75@.95
MANGANESE—Powdered, 70@75% binoxide	lb.	.01¼@.01½
Crude pow'd. 75@85% binoxide	"	.01⅛@.02¼
85@90% binoxide	"	.02¼@.03¼
90@95% binoxide	"	.03¼@.05½
Carbonate	"	.16@.20
Chloride	"	.04
Ore, 50%, Foreign	unit	.18@.19
Domestic	"	.30
MARBLE—Flour	sh.ton	6.00@7.00
MERCURY—Bichloride	lb.	.77
MICA—N. Y. gr'nd, coarse.	sh.ton	33.00@38.00
Fine	lb.	.00⅞@.02
Sheets, N. C., 2x4 in.	"	.30
3x3 in.	"	.80
3x4 in.	"	1.50
4x4 in.	"	2.00
6x6 in.	"	3.00
MINERAL WOOL—		
Slag, ordinary	sh.ton	19.00
Selected	"	25.00
Rock, ordinary	"	32.00
Selected	"	40.00
NICKEL Oxide, No. 1	lb.	1.00
No. 2	"	.60
Sulphate	"	.20@.21
OILS—Black, reduced 29 gr.:		
25@30, cold test	gal.	.11½@.12½
15, cold test	"	.12½@.12¾
Zero	"	.13½@.13¾
Summer	"	.11@.12
Cylinder, dark steam ref.	"	.10¼@.11¾
Dark, filtered	"	.15½@.17½
Light, filtered	"	.16½@.19
Extra cold test	"	.27½@.31½
Gasoline, 86°@90°	"	.16@.21
Naphtha, crude, 68°@72°.	bbl.	11.20
"Stove"	gal.	.14½
Linseed, domestic raw	"	.41@44
Boiled	"	.46
Calcutta, raw	"	.75
OZOKERITE	lb.	.11½
PAINTS AND COLORS—		
Chrome green, common	"	.03
Pure	"	.16
Yellow, common	"	.10¼
Best	"	.14
Lampblack, com'l	"	.04½
Refined	"	.07
Litharge, Am. pow'd	"	.05⅝@.06
English flake	"	.08¼@.08½
Glassmakers'	"	.06½@.08¼
PAINTS AND COLORS—	Cust.Meas.	Price.
Metallic, brown	sh.ton	$15.00
Red	"	16.00
Ocher, Am. common	"	9.25@10.00
Best	"	21.25@25.00
Dutch, washed	lb.	.03¾
French, washed	"	.01½@.01⅞
Orange mineral, Am.	"	.08½@.08⅝
Foreign, as to make	"	.08½@.10¼
Paris green, pure, bulk	"	12
Red lead, American	"	.06¼@.06½
Foreign	"	.06⅝@.08
Turpentine, spirits	gal.	.49½@.50
White lead, Am., dry	lb.	.05½@.05¾
American, in oil	"	.07@.09
Foreign, in oil	"	.07@.07¾
Zinc, white, Am., ex dry	"	.04¾@.04¾
Foreign, red seal, dry	"	.06@.06½
Green seal, dry	"	.06½@.06¾
POTASH		
Caustic, ordinary	"	.04½@.04⅝
Elect. (90%)	"	.06¼
POTASSIUM—		
Bicarbonate cryst	"	.08¼
Powdered or gran.	"	.14
Bichromate, Am.	"	.08½@.08¾
Scotch	"	.08½@.09
Bromide, bulk	"	.22
Carbonate (80@85%)	"	.03½@.04
Chlorate, f.o.b. works	"	.07@.07½
Foreign, f.o.b. N. Y.	"	.07⅛@.07¼
Chromate	"	.35
Cyanide (98@99%)	"	.20
Kainit	lg.ton	9.30
Manure salt, 20%	100 lbs.	.90
D'le Manure Salt, 48@53%	"	1.12
Muriate, 80@85%	"	1.83
95%	"	1.86
Permanganate	lb.	.09¼@.10
Prussiate, yellow	"	.13¼@.13½
Red	"	.34
Sulphate, 90%	100 lbs.	2.11
96%	"	2.14
Sylvanit	unit	.41
QUARTZ—(See Silica).		
SALT—N. Y. com. fine 280 lbs	bbl.	.72@1.18
N. Y. agricultural	sh.ton	4.40
SALTPETRE—Crude	100 lbs.	3.40
Refined	"	4.25@4.62½
SILICA—Best foreign	lg.ton	10.00@11.00
Ground quartz, ord.	sh.ton	6.00@8.00
Best	"	12.00@13.00
Lump quartz	"	2.50@4.00
Glass sand	"	2.75
SILVER—Chloride	oz.	.65
Nitrate Crystals	"	.32½
Oxide	"	.85@1.10
SODIUM—		
Bicarb., ordinary, f.o.b. w'ks	100 lbs.	1.25
Bichromate	"	1.60
Foreign, f.o.b. N. Y.	"	3.50
Extra domes. f.o.b. w'ks	lb.	.06¼
Carbonated ash, high test, in bags, f.o.b. works	100 lbs.	.72½@.75
Foreign, f.o.b. N. Y.	"	.90@.92½
Caustic, 60@78%, f.o.b. w'ks	"	1.70@1.75
Foreign, f.o.b. N. Y.	"	1.90@2.00
Chlorate, com'l	"	.07¼@.07¾
Hyposulphite, Am.	"	1.60@1.65
German	"	1.70@1.90
Nitrate, spot	"	2.00
Shipments	"	1.90
Peroxide	lb.	.45
Phosphate	"	.02½@.02¼
Prussiate	"	.09¾
Sal soda, f.o.b. works	100 lbs.	.55
Foreign, f.o.b. N. Y.	"	.67½
Silicate, conc.	lb.	.05
Com'l	"	.01
Sulphate, com'l	100 lbs.	82½
Sulphide	lb.	.01¼
Sulphite crystals	"	.02½
SULPHUR—Roll	100 lbs.	1.85
Flour	"	1.90
Flowers, sublimed	"	2.15
TALC—N. C., 1st grade	sh.ton	18.00
N. Y., Fibrous, best	"	10.20
French, best	100 lbs.	1.25
Italian, best	"	1.62½
TAR—Regular	bbl.	2.40
Oil barrels	"	4.40
TIN—Crystals	lb.	.22
Oxide	"	.45
URANIUM—Oxide	"	2.25@3.00
ZINC—Metallic, ch. pure	"	.07@.09½
Carbonate, ppt.	"	.09
Chloride solution, com'l	"	.02½
Chloride granular	"	.04¼@.04¾
Dust	"	.04¾@.04½
Sulphate	"	.02½@.02¾

THE RARE EARTHS.

BORON—Nitrate	lb.	$1.50
CALCIUM—Tungstate (Scheelite)	"	.60
CERIUM—Nitrate	"	10.00
DIDYMIUM—Nitrate	"	25.00
ERBIUM—Nitrate	"	40.00
GLUCINUM—Nitrate	"	20.00
LANTHANUM—Nitrate	"	20.00
LITHIUM—Carbonate	"	1.25
LITHIUM—Nitrate	oz.	.60
STRONTIUM—Nitrate	lb.	.07¼@.08½
THORIUM—Nitrate 49@50%	"	4.50
URANIUM—Nitrate	oz.	.25
YTTRIUM—Nitrate	lb.	40.00
ZIRCONIUM—Nitrate	"	8.00

NOTE.—These quotations are for wholesale lots in New York unless otherwise specified, and are generally subject to the usual trade discounts. Readers of the ENGINEERING AND MINING JOURNAL are requested to report any corrections needed, or to suggest additions which they may consider advisable.